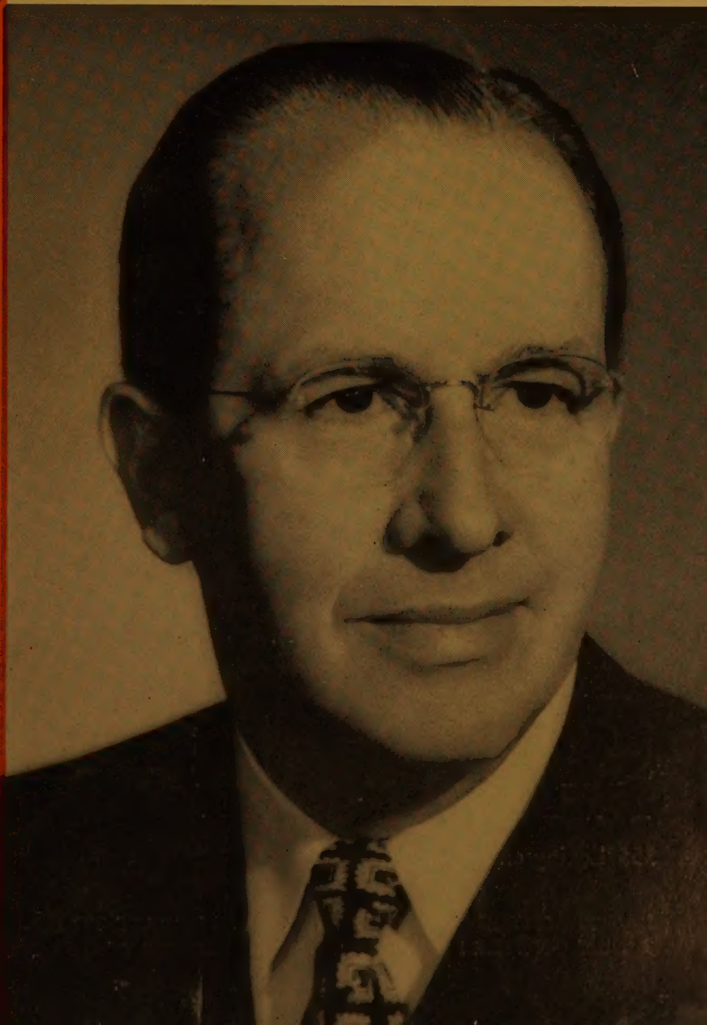
WATTLE RESEARCH INSTITUTE
21 MAR 1960
UNIVERSITY OF NATAL, P.M.B.

AGRICULTURAL *Chemicals*

IN THIS ISSUE:

- '59 Fertilizer Consumption
- New Herbicides
- Changing Fertilizer Economy
- Pesticides in Cotton Production
- Fertilizer Production
- A New Concept of Pest Control
- Fertilizer Sales Workshop
- Chemicals in Food Production
- APPLICATOR SECTION

FEBRUARY, 1960



WHICH PAPER IS BEST FOR MY MULTIWALLS?

your Chase Bag representative gives you the unbiased answer

Stretchable, non-skid, creped or regular kraft . . . fully bleached, semi-bleached, colored outer sheet . . . Chase Bag buys paper for multiwalls on an open market, to *your* best advantage! This means unprejudiced advice from your Chase representative . . . he'll help you select the paper that best fits your product, your filling machinery, your shipping, storing and handling needs.

CALL YOUR CHASE REPRESENTATIVE WHENEVER YOU HAVE A BAGGING PROBLEM . . . HE'S A SPECIALIST AT CUTTING PACKAGING COSTS

CHASE
BAG COMPANY
355 Lexington Avenue, New York 17, N. Y.

BAG PLANTS AND SALES OFFICES FROM COAST TO COAST
A NATIONWIDE STAFF OF BAG SPECIALISTS AT YOUR SERVICE

POTASH COMPANY OF AMERICA

QUICK SERVICE
HIGH QUALITY

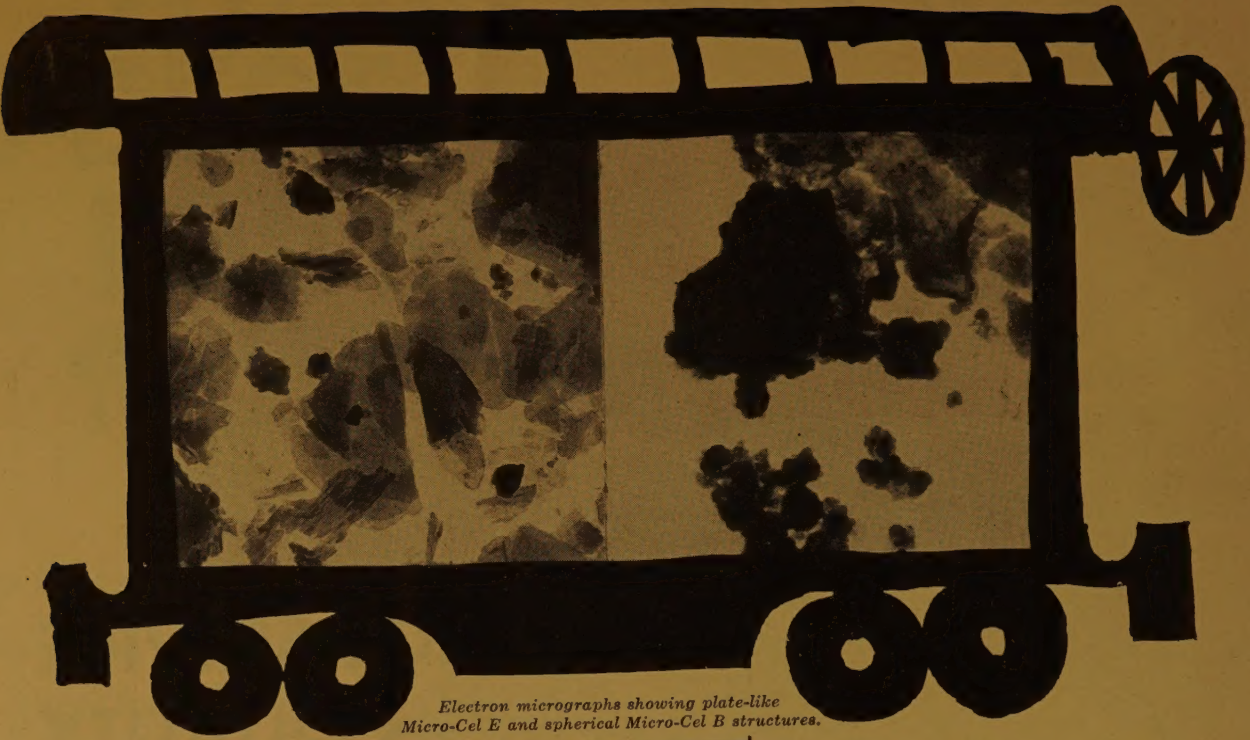
P.C.A.
The SALT of the EARTH
RED MURIATE

New 60% Standard Muriate
New 60% Special Granular Muriate
New 60% Coarse Granular Muriate
Sulphate of Potash
Chemical Muriate — 99.9% KCL minimum

Phone, write, telex, or wire us
Phone STerling 3-4990, Washington
TWX No. — WA—331.

POTASH COMPANY OF AMERICA
CARLSBAD, NEW MEXICO.

General Sales Office . . . 1625 Eye Street, N.W., Washington, D.C.
Midwestern Sales Office . . . First National Bank Bldg., Peoria, Ill.
Southern Sales Office . . . Candler Building, Atlanta, Ga.

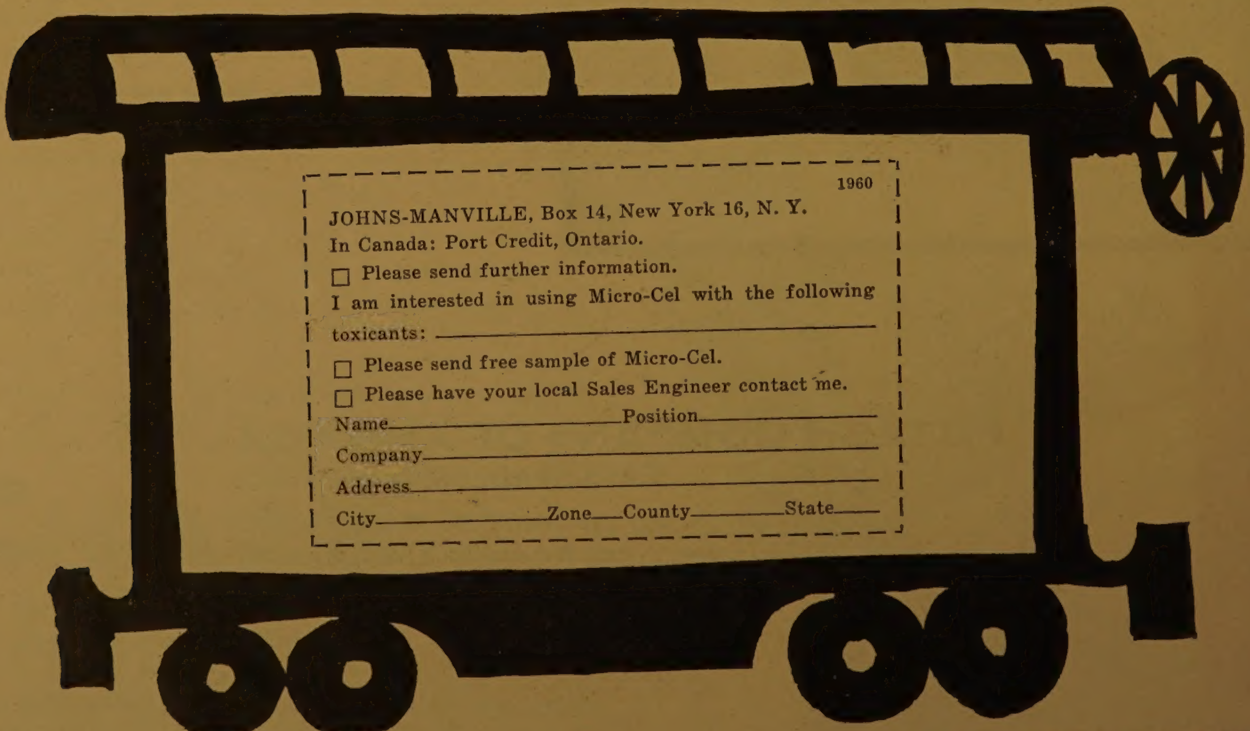


Electron micrographs showing plate-like Micro-Cel E and spherical Micro-Cel B structures.

Ship more toxicant per carload with Micro-Cel!

Micro-Cel®, Johns-Manville's inert synthetic calcium silicate, permits 75% DDT concentration. Other freight-saving, high toxicant concentrations include: 50% Malathion, 70% Toxaphene, 50% Heptachlor, 75% Aldrin and 50% Aramite. Micro-Cel's unique structural characteristics (surface areas up to 175 sq. m/gr) reduce caking, improve flowability, increase suspendability and extend shelf life. For further information, samples and technical assistance, mail in the coupon below!

JOHNS-MANVILLE
Celite Division



1960

JOHNS-MANVILLE, Box 14, New York 16, N. Y.
In Canada: Port Credit, Ontario.

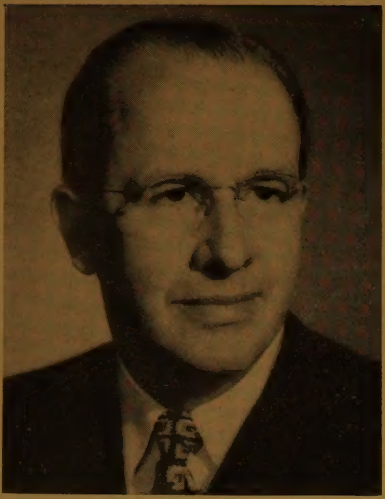
☐ Please send further information.

I am interested in using Micro-Cel with the following toxicants: ____________________

☐ Please send free sample of Micro-Cel.

☐ Please have your local Sales Engineer contact me.

Name____________________ Position____________________
Company____________________
Address____________________
City____________ Zone____ County____________ State______



This Month's Cover

Last month, Secretary of Agriculture, Ezra Taft Benson, issued a statement on "Chemicals and Foods," in which he observed that "we cannot continue to produce adequate amounts of safe and wholesome foods without chemicals." See story on page 37.

Publisher
Wayne E. Dorland

Editor
Eleonore Kanar

Managing Editor
Richard D. McNally

Advertising Manager
Ralph Dorland

District Managers
Roger Appleby
William Ryan

Circulation Manager
David Tryon

MEMBER AUDIT BUREAU OF CIRCULATIONS

Vol. 15, No. 2 **February, 1960**

AGRICULTURAL *Chemicals*

ARTICLES

NORTHWEST AGRICULTURAL CHEMICALS CONFERENCE 28
By Loren Milliman

FERTILIZER CONSUMPTION UP 12% in 1959 30
By Walter Scholl, M. M. Davis, E. I. Cox, C. A. Wilker

WISCONSIN PESTICIDE CONFERENCE 33

FERTILIZER'S ROLE IN CHANGING THE AGRICULTURAL ECONOMY 35
By Vernon W. Ruttan and Calvin R. Berry

FERTILIZER PRODUCTION—PART 3 OF ROUND TABLE REPORT 38

NEW HERBICIDES 41
By W. A. Harvey

NORTHEAST FERTILIZER WORKSHOP 45

BELTWIDE COTTON MECHANIZATION CONFERENCE 46

SILIKIL, A NEW APPROACH TO PEST CONTROL 49

RAHN SUCCEEDS UTTER AS PRESIDENT OF NEWCC 50

FEATURES

IN THE SPOTLIGHT THIS MONTH 9

INDUSTRY CALENDAR 14

WASHINGTON REPORT 54
By Donald Lerch

THE AGRICULTURAL APPLICATOR 57

PEST ROUNDUP 71
By Kelvin Dorward

THE LISTENING POST 73
By Paul Miller

FERTILIZER VIEWS AND NEWS 75

INDUSTRY NEWS 78

EQUIPMENT AND BULLETINS ....

PROFESSIONAL DIRECTORY 117

CLASSIFIED ADVERTISING 119

ADVERTISERS INDEX 121

TALE ENDS 122

PUBLISHED monthly on the 1st, by Industry Publications, Inc.

ADVERTISING and Editorial Office, P. O. Box 31, Caldwell, New Jersey.

PUBLICATION Office: 123 Market Pl., Baltimore, Md.

ENTERED as second-class matter November 4, 1949 at the Post Office at Baltimore, Md., under the Act of March 3, 1879.

SUBSCRIPTION RATES: United States, 1 year, $3.00; 2 years, $5.00. Canada and Pan American countries, 1 year, $4.00; 2 years, $7.00. All other foreign countries, 1 year, $9.00; 2 years, $15.

SINGLE COPIES: current issue: $0.50; all back numbers $1.00. Postage and handling charges for foreign countries on single copies: $1.00. Claims for missing numbers will not be allowed if received more than 60 days from date of mailing. No claims allowed from subscribers arising from failure to notify the Circulation department of a change of address, or because a copy is "missing from files."

ADVERTISING RATES known on request. Closing date for copy—5th of month preceding month of issue.

tomatoes

potatoes

eggplants

melons

cucumbers

peppers

squash

beans

---

now...use Thiodan® on all these

Broader registration for Niagara's powerful new insecticide means more effective, economical control of aphids, other insects this season

Latest in the growing list of crops on which use of the new insecticide Thiodan has approved registration for aphid control are cucumbers, melons, summer squash and winter squash. Earlier this year, registration had been extended to tomatoes, peppers and eggplants for aphids; to broccoli, cabbage and cauliflower for cabbage looper, imported cabbage worm and diamond-back moth larvae; and to beans for Mexican bean beetles.

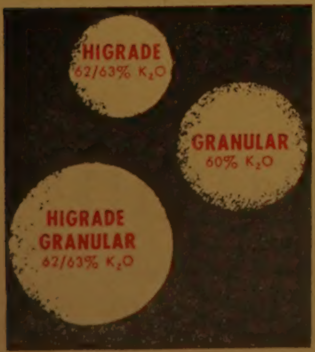
As potato growers who used Thiodan last year attest, the new Niagara product is remarkably effective against a wide range of insects including aphids. Thiodan cleaned up heavy aphid infestations where other sprays and dusts failed. It outperformed previously available materials—which required repeated applications—not only in degree of control but in length of effectiveness. And Thiodan controlled leafhoppers, flea beetles, Colorado potato beetles and other insects as well as aphids.

With Thiodan approved for the other crops this season, you can say goodbye to aphid control headaches you've had in past years. You can apply Thiodan up to seven days prior to harvest on tomatoes, eggplants, peppers . . . fourteen days on cucumbers, melons, squash . . . up to pod-formation on beans. This means you keep aphids completely in check at the time they do the most damage. Write for details. We'll be happy to tell you what Thiodan is doing for growers.

Thiodan®

TECHNICAL CHEMICAL DEPT., NIAGARA CHEMICAL DIVISION, FOOD MACHINERY AND CHEMICAL CORPORATION, MIDDLEPORT, N. Y.

To help you make better fertilizers... three grades of specially-sized potash



Muriate of potash ideally sized to meet your fertilizer manufacturing requirements. For mixed fertilizers, you get most potash per ton from our two white grades—Higrade muriate, and Higrade Granular muriate—each contains 62/63% K_2O. For fertilizers requiring a larger particle size, choose our Granular muriate containing 60% K_2O. All three grades are specially refined to resist caking and remain free-flowing. The particle sizes are uniform.

Complete technical data, samples, and accurate shipping information will be furnished promptly by our expertly staffed Technical Service Department on request.

UNITED STATES BORAX & CHEMICAL CORPORATION

50 Rockefeller Plaza, New York 20, N.Y.

Southern Sales Office: Rhodes-Haverty Building, Atlanta, Georgia

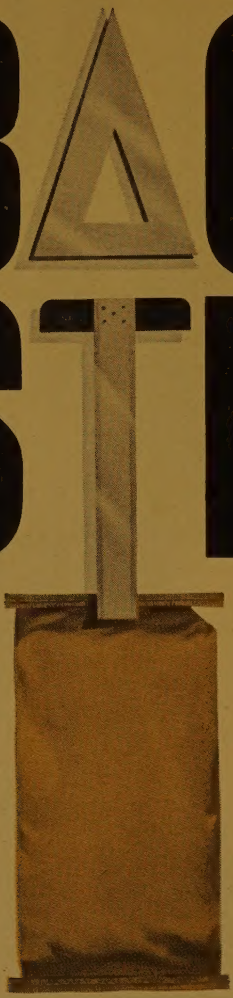
Basic Producers of Potash and Borates for the Fertilizer Industry

UNITED STATES POTASH
A PRODUCT OF NEW MEXICO U.S.A.

MEMBER:
AMERICAN
POTASH
INSTITUTE

REG. U.S. PAT. OFF.

last year more than 150 multiwall users reduced their packaging costs thru UNION-CAMP'S



BAG CONSTRUCTION

another FREE service of the 5 Star Packaging Efficiency Plan!

How much could you save through UNION-CAMP'S 5-Star Packaging Efficiency Plan? Look at the record. Last year a single feature of this unusual service—bag construction—helped over 150 companies cut their multiwall costs. By tens of thousands of dollars!

Improved bag construction lowered the basis weight of a southern packer's multiwalls by 10 per cent. He netted $30,000 as a result. Another firm saved $42,000. A third, following UNION-CAMP'S recommendations for a new, stronger closure, largely eliminated breakage and netted packaging economies totaling $4.05 per M.

In addition to bag construction this comprehensive packaging program offers you four other important services. Bag design. Specifications control. Packaging machinery analysis. A survey of your plant. And it's free—regardless of the brand of multiwalls you now use.

Why not take advantage of it now by getting in touch with your local UNION-CAMP man?

UNION-CAMP®
MULTIWALL BAGS
Union Bag-Camp Paper Corporation · 233 Broadway N.Y. 7, N.Y.

★ BAG DESIGN · BAG CONSTRUCTION · SPECIFICATIONS CONTROL · PACKAGING MACHINERY · PLANT SURVEY

International Market Round-Up

International trade in all materials has been very brisk. The leader in terms of dollar volume was nitrogen.

It is reported that China purchased approximately 350,000 tons of contained nitrogen from European suppliers during 1959, at prices roughly 10-15% below 1958 levels. India purchased approximately 230,000 tons of nitrogenous fertilizers last fall, and was expected to purchase a similar quantity in January.

Korea held a tender last month for approximately $12.3 million worth of nitrogenous fertilizers financed by U. S. government funds, and approximately one month thereafter will be purchasing by private traders $8.2 million worth of nitrogenous fertilizers.

Egypt recently purchased 175,000 tons of nitrogenous fertilizers.

Overall, the situation appears to be in better balance in Europe, where very heavy export sales have largely taken up the slack between production and consumption. In Japan, the surpluses of urea have been temporarily reduced by substantial export sales, and the surplus of ammonium sulphate is expected to be dissipated in Korea and perhaps in India during the coming three or four months.

Potash

Japan purchased 508,500 tons of K_2O from the United States, Germany, France, Spain, Russia and Israel. Shipments of 24,000 tons of muriate of potash were made to Formosa from the United States. However, this market has been characterized by some fluctuation in prices due to the efforts of a few producers who are anxious to dispose of exportable quantities.

Canadian production of potash has been temporarily halted due to mining difficulties, but is expected to resume early in 1960.

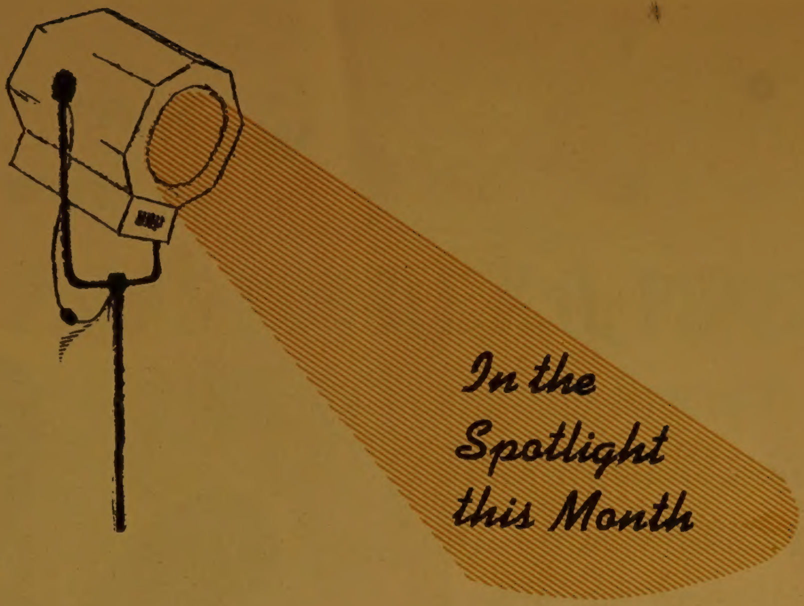
FAO Meeting

The Food & Agriculture Organization of the United Nations held a meeting in Rome on December 7th and 8th and invited representatives of the world fertilizer industry to listen to the report by members of a team which was dispatched to conduct a preliminary survey on fertilizer economics in Asia and the Far East as a part of the "Freedom From Hunger" campaign.

Members of the team included: W. L. Nelson, American Potash Institute; T. Mather, Consolidated Mining & Smelting Company of Canada Limited; W. Klatt, United Kingdom Foreign Office; W. K. Mukherjee of Sindri Fertilizers, India; N. Erus and H. J. Page, both of the FAO.

The report of the team will be issued later this month, and will carry an outline of the fertilizer situation in the eight countries visited, as well as making certain recommendations. The countries visited were: Thailand, Malaya, Philippines, Japan, India, Ceylon, Indonesia, Pakistan.

Compiled by International Ore & Fertilizer Corp., N. Y.



- **No Nitrogen Losses . . .** Even in production of X-O-X grades, "there are no nitrogen losses," in the Wilson & Toomer fertilizer plant, — according to its production manager, who reviews plant operation, describing pre-mixing, the push-through air system, and ammoniation rates. Page 38.
- **New Herbicides . . .** Discussing new weedkillers and their application, a University of California weed control specialist observes "it is unfortunate that most of the materials are screened in the East, under differing conditions of rainfall and higher humidity. In the West we must start over again, screening them under our conditions of use." Page 41.
- **Fertilizer Consumption Up . . .** The preliminary report on 1959 fertilizer consumption shows a tremendous increase in use. Total tonnage is up 12 per cent, and plant nutrients are up 13 per cent over the previous year. Page 31.
- **Heptachlor on Schedule . . .** Although a zero tolerance has been set on heptachlor and its epoxide, 1960 Wisconsin recommendations still include heptachlor for control of soil insects on corn. There is no evidence, Wisconsin entomologists report, that the pesticide will move from the soil into the above-ground portion of the crop. Reports given at the Wisconsin pesticide conference indicated that a heptachlor mixture gave the best control of spittlebug,—but that only methoxychlor could be recommended for spittlebug control on alfalfa or red clover. Page 33.
- **Fertilizer Survey . . .** A startling result of a survey of Indiana farmers was that fertilizer customers do not rank the man they buy fertilizer from as the best source of information on new fertilizer material. Almost one-half of the farmers interviewed in Indiana named the county agricultural agents as their nominal source of information on new fertilizer materials. Page 35.
- **Cotton Pesticides . . .** 1960 is expected to be an important year for use of chemicals as weed control agents for cotton. A new hormone under investigation shows promise in the control of boll drops. Page 46.
- **Agricultural Applicator . . .** A Stockton, California, aerial applicator operates a fleet of helicopters to service his customers in the San Joaquin Valley. He reports that his business is expanding despite the slightly higher costs of helicopter application over other methods. Page 57.

DAVISON Hi-Flo Gran-U-Lated Triple Superphosphate is unexcelled by any other

$(S_1Q_2D_2TA_1)$ The Davison formula of properly proportioned parts of Service, Quality, Dependability, Delivery and Technical Assistance $(S_1Q_2D_2TA_1)$ is as important to you in your choice of source as anything else we could name.

In every field, there is always one particular brand that is so outstanding that it is head and shoulders above the competition. That is true of Davison Hi-Flo Gran-U-Lated Triple Superphosphate. Here is the product that *is* the standard of comparison for all other granulated triples. Davison Gran-U-Lated Triple Superphosphate is uniform in particle size . . . dust free and will not break down or crumble in the bag. It is ideal for direct application or for formulation of dry materials. Most of all, with Davison Gran-U-Lated you are certain of constant uniformity . . . it is GUARANTEED 46% available P_2O_5 . . . every time.

A test carload will prove it to you. Simply call us today. The Davison Sales and Technical Representative will be happy to provide complete information.

W. R. GRACE & CO.
DAVISON CHEMICAL DIVISION
Baltimore 3, Md.

Fairfield Facts

INDUSTRIAL EDITION

NEW TOXICANT PACKS DOUBLE K.O. PUNCH

Fairfield Offers Non-Agricultural Strobane Concentrates

Strobane** solutions for non-agricultural use may be obtained through local representatives and sales offices of Fairfield Chemicals, Food Machinery and Chemical Corp.

Available in standard 80-percent concentrates, Strobane is an effective toxicant for a broad range of household and industrial insecticides. In combination with Fairfield's Pyrenone, it provides thorough, quick-working control of DDT resistant flies. Alone, Strobane is an excellent moth-proofing agent.

Fairfield Strobane is available in concentrate form only for non-agricultural purposes.

Complete information is available from Fairfield sales offices.

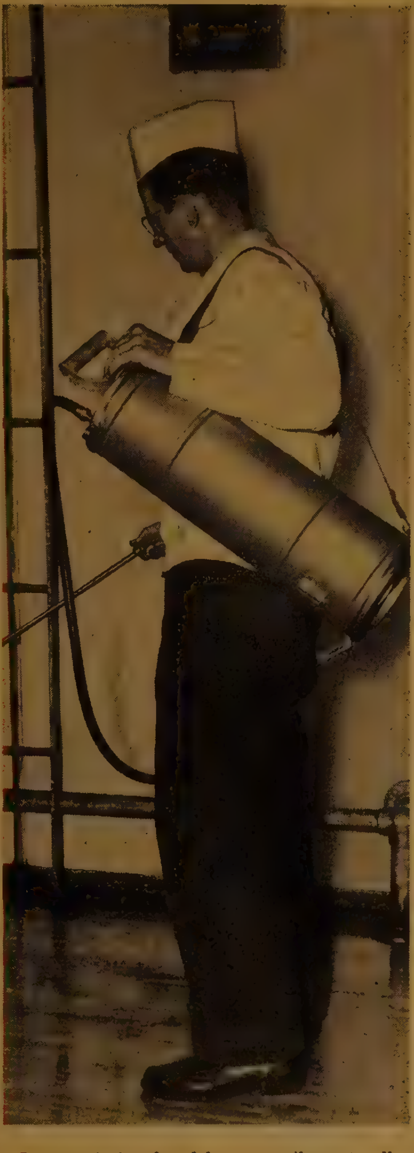
Fairfield Facts Finder Has Comprehensive Data

Formulations for virtually every type of insecticide product are contained in a comprehensive 20-page guide prepared by Fairfield Chemicals, Food Machinery and Chemical Corp., for entomologists, formulators, agricultural teachers, county agents, and others.

The Facts Finder includes use-tested sprays, powders, emulsions and aerosol insecticides for home, garden, factory, livestock, grain storage and food processing. Also included are Pyrenone and Crag(†) Fly Repellent Combinations.

The new Fairfield Facts Finder is fully illustrated, contains a pest identification table, performance charts, and has a unique revolving calculator that offers complete formulary data in an instant for 15 Pyrenone insecticide concentrates.

Price $1.00.



Pyrenone's fast knockdown contributes to all residual sprays. Pyrenone Aerosol Concentrate 20-8 added to such residual toxicants as Diazinon, Dieldrin Malathion and Chlordane provides flushing action and knockdown effectiveness. When using residual sprays, customers demand quick action at the time of application and pyrethrins and piperonyl butoxide provide this response while spraying.

Fairfield Concentrate Reinforces Residual With Quick Knockout

An insecticide concentrate combining a high knockdown rate, fast insect flushing and long lasting residual effectiveness has been developed by Fairfield Chemicals, Food Machinery and Chemical Corp., New York City.

Called Fairfield Residual Concentrate No. 1, it is a combination which includes Pyrenone* — pyrethrins with the synergist piperonyl butoxide—and Malathion. Easily diluted with a base oil and used as a surface spray, the new concentrate is highly effective against crawling, flying and resting insects.

Prepared for indoor use at a suggested dilution rate of one part concentrate and nine parts base oil, Fairfield Residual Concentrate No. 1 has a high knockdown rate because of its Pyrenone component. This factor also enhances its value in dealing with many resistant fly and roach strains. Its Malathion component is widely known for its effectiveness in residual roach control.

One long-established characteristic of Malathion—its inherent odor, even at high dilution levels—has been markedly reduced by Fairfield research without interfering with its insect-killing properties. Thus, the new concentrate may be used in high traffic areas where previously a strong chemical odor would be a deterring factor.

Because it adapts easily to application by commonly used spray equipment and because of its ability to control a wide range of common pests, Fairfield Residual Concentrate No. 1 is ideal for general purpose use. It may be applied for spot treatment of such crawling insects as cockroaches, ants, spiders, silverfish, crickets, clover mites, carpet beetles, scorpions, boxelder bugs and brown dog ticks. Residues formed by the spray are fatal to resting houseflies, wasps and mosquitoes.

Formulary data and suggested label information are included in a new, free technical bulletin F-16, available upon request.

Putting Ideas to Work

FOOD MACHINERY AND CHEMICAL CORPORATION
Fairfield Chemicals
Sales Headquarters
441 LEXINGTON AVENUE, NEW YORK 17, N. Y.
Branches in principal cities. In Canada: Natural Products Corporation, Montreal and Toronto.

---

*Reg. U.S. Pat. Off., FMC
**Reg. U.S. Pat. Off. Heyden Newport Chemical Corp.
†Reg. U.S. Pat. Off., U.C.C.

We shortened the name... and enlarged our services

It takes only a matter of minutes to change the name on an office door. But it took months of planning to organize St. Regis' all-out program to meet the ever-changing needs of our shipping bag customers. Now, with expanded facilities, we're prepared to serve you better than ever before.

The new St. Regis Bag Division was developed to provide you with four important services: *the right bag* for your product, *the best equipment* to fill it, *an engineering staff* to help reduce your over-all packaging costs, and, wherever possible, *new packaging systems* and methods.

It's so complete in every way, we call this new program *Packaging-In-Depth*.

It was made possible by consolidating St. Regis'

basic Multiwall organization with four highly-successful and respected paper and textile bag companies. We now offer a *complete* product line: multiwall, burlap, textile, mesh . . . whatever you need. We now have *13 manufacturing plants* for more efficient coverage of key areas throughout the country where industries depend on bags for shipping their products. In these areas, a complete staff of packaging engineers is ready to give you skilled service quickly.

Our research and development facilities are now available to all segments of the new Bag Division, to explore and perfect the most advanced, most efficient packaging methods.

One thing more. The people who *make* your bag are best qualified to supply the bag filling and closing machinery for your operation. St. Regis actually designs and produces the most complete line of packaging machinery in this field: more than 50 different models.

To sum up: more *diversified* services to offer . . . more *specialized* people to meet your needs. And though our men have *years* of experience in many fields, the spirit of St. Regis' new Bag Division is young and eager. We look forward to serving you soon.

BAG DIVISION
St. Regis
PAPER COMPANY
150 EAST 42ND STREET, NEW YORK 17, N.Y.

Lone Star Bag Division • Lubbock Bag Division • Wagner Bag Company, Inc.
Chemical Packaging Company • Mid-America Bag Division

HIGH-K

MURIATE
OF POTASH
for the
PLANT FOOD INDUSTRY

THIS symbol stands for high-grade uniform, coarse and granular Muriate of Potash (60% K_2O minimum). Southwest Potash Corporation provides a dependable supply of HIGH-K* Muriate for the plant food industry.

*Trade Mark

Southwest Potash
Corporation

61 BROADWAY • NEW YORK 6, N. Y.

MEETING CALENDAR

Feb. 2-4 — Pest Control Operators' School, N. C. State College, Raleigh, North Carolina

Feb. 3-4 — Illinois annual fertilizer industry conference, University of Illinois, Urbana.

Feb. 6-8—National Cotton Council, Hotel Statler, Dallas, Texas.

Feb. 8-9 — Southwestern Branch, Entomological Society of America, Hilton Hotel, El Paso, Texas.

Feb. 9-10—Utah Fertilizer Industry Conference: Feb. 9, Provo; Feb. 10, Ogden

Feb. 9-11 — Southern Regional Liquid Fertilizer Conference, Rock Eagle 4-H Club Center, Eatonton, Ga.

Feb. 9-11 — Texas Agricultural Chemicals Conference, Texas Tech. College, Lubbock, Texas.

Feb. 10-12 — Midwestern Chapter, National Shade Tree Conference, Sheraton-Fontennelle Hotel, Omaha, Nebr.

Feb. 11—Conference on use of Agricultural Chemicals, Oregon State College, Corvallis

Feb. 11-12—Midwest Agronomists-Fertilizer Industry meeting, Edgewater Beach Hotel, Chicago, Ill.

Feb. 17-18—Alabama Pest Control Conf., Alabama Polytechnic Institute, Auburn, Ala.

Feb. 21-23—9th Annual Agricultural Aviation Conference, Texas A&M College, College Station, Texas

Feb. 22-25—Weed Society of America, Third Biennial Meeting, Cosmopolitan Hotel, Denver, Colo.

March 22-23—Western Agricultural Chemicals Asso., Miramar Hotel, Santa Barbara, Calif.

March 23-25—North Central Branch, Entomological Socety of America, Schroeder Hotel, Milwaukee, Wisc.

March 30-31—Georgia Entomological Society, 24th annual meeting, New Science Center, University of Georgia, Athens.

Apr. 6-7—LSU Forestry Symposium, Louisiana State Univ., Baton Rouge.

June 12-15 — National Plant Food Institute, annual meeting, Greenbrier Hotel, White Sulphur Springs, W. Va.

June 27-29 — Pacific Branch, Entomological Society of America, Davenport Hotel, Spokane, Wash.

Oct. 17-18—Fertilizer Section, National Safety Congress, Chicago.

Dec. 5-7—Carolinas-Virginia Pesticide Formulators Assn. annual meeting, Carolina Hotel, Pinehurst, N. C.

The extra care that produces

SWIFT'S PHOSPHATES

puts customer satisfaction

in your goods!

Extra care in our laboratories assures that you get the exact grade you desire.

P-3R

. . . And that *extra care* is just as real as the people who give it . . . people like your customers . . . people like your friends and neighbors—second and third generation people with the phosphate business literally bred into them working with Swift, the oldest phosphate operator in Florida.

Swift's extra care may very well offer you the opportunity to improve your customer satisfaction . . . your plant operations . . . and your profits. It's worth checking into! Have a Swift Phosphate Center Representative outline the advantages Swift offers you in phosphates—triple, rock or ground rock.

THE SERVICE CENTER FOR ALL YOUR PHOSPHATE NEEDS

SWIFT & COMPANY
PHOSPHATE CENTER
Bartow, Florida

Swift
105TH YEAR

To Serve Your Industry Better WITH PHOSPHATE ROCK, GROUND PHOSPHATE ROCK AND MINUTE MAN TRIPLE SUPERPHOSPHATE

Chemicals for better, easier & more profitable farming...

...are shipped best in **Vulcan** steel pails and drums

VULCAN®

Attach this ad to your calling card and mail today for ☐ free literature, or ☐ a meeting with your local 'Vulcansultant' a technical man who can help you with your container problems. • *In California:* Vulcan Containers Pacific Inc., *San Leandro* • *In Canada:* Vulcan Containers Limited, *Toronto, Vancouver, B.C.*

VULCAN CONTAINERS INC., *Bellwood, Illinois, Phone: LInden 4-5000*

AC-20

TC
TENNESSEE CORPORATION

COPPER SULFATE

Tennessee Corporation mines Copper and converts it to Copper Sulfate at Copperhill, Tennessee. It is offered in powdered form as well as Large, Medium, Industrial, Granular and Snow Crystals.

Users who require very high uniformity and purity, but at a competitive price, specify TENNESSEE COPPER SULFATE.

Copper Sulfate and other copper chemicals

TENNESSEE TC CORPORATION
615-629 GRANT BUILDING, ATLANTA 3, GEORGIA

FROM SOHIO AT LIMA . . .

a line of Nitrogen products complete to the Nth degree

Sohio's complete line of nitrogen materials gives you the full-range flexibility you need in manufacturing high-analysis finished goods. Choose from a long list of Sohiogen® Solutions, anhydrous and aqua ammonia and Sohigro® Urea to meet your exacting requirements. The "Man from Sohio" will be glad to help you with formulations . . . and explain how you can benefit from Service at Sohio. Call him soon.

A complete line of Sohio nitrogen products for fertilizer manufacture

Ammonium Nitrate — Ammonia Solutions

Sohiogen 4424 Sohiogen 4122 Sohiogen 4526 Sohiogen 4730 Sohiogen 4126 Sohiogen 4934	Old-line and concentrated solutions for both conventional and granulation use

Urea — Ammonium Nitrate — Ammonia Solutions

Sohiogen 4119 Sohiogen 4320 Sohiogen 4422 Sohiogen 4425 Sohiogen 4428 Sohiogen 4933	Ammonium nitrate nitrogen solutions containing 6 to 15% urea to: 1. lower salting out temperatures of solutions 2. improve granulation 3. help condition mixed goods

Urea — Ammonia Solutions

Sohiogen 2104 Sohiogen 4531 Sohiogen 4537	Urea and ammonia in 45% nitrogen solutions, winter and summer grades, and high urea content solutions for liquid fertilizer manufacture

Urea — Ammonium Nitrate Solutions

Sohiogen 2800 Sohiogen 3200	28 and 32% nitrogen solutions containing no free ammonia — ideal for surface and subsurface application — as materials and in complete liquid fertilizers

Anhydrous and Aqua Ammonia

Sohigro® Urea — your choice of 45% N coated or 46% N uncoated, prilled urea supplemental source of nitrogen

SOHIO

. . . we're serious about SERVICE at Sohio

SOHIO CHEMICAL COMPANY

FORT AMANDA RD., P. O. BOX 628 • LIMA, OHIO
Phone CApitol 5-8015 or wire (TWX call letters LIMA 0 497-U) 9-58

ATTENTION: Insecticide Formulators

the New STURTEVANT PULVER-MILL

A VERTICAL AIR-SWEPT IMPACT MILL WITH INTEGRAL AIR CLASSIFIER FOR FINE GRINDING OF ALL TYPES OF INSECTICIDES

*Patent pending

DOUBLE IMPACT GRINDING

Revolving impactors pass between fixed wall impactors to substantially increase grinding efficiency.

DEFLECTOR WALL CONSTRUCTION

Exclusive Deflector Wall design "bounces" partially ground material back into the grinding zone — speeds grinding process.

ADJUSTABLE AIR CLASSIFICATION

Special intake vane design "whirls" vertical air flow. Adjustable selector bar system provides precise end-product selection.

Write for full information. Request Bulletin 094.

CRUSHERS
GRINDERS
MICRON-GRINDERS
SEPARATORS

STURTEVANT
MILL COMPANY
123 Clayton St., Boston 22, Mass.

BLENDERS
GRANULATORS
CONVEYORS
ELEVATORS

PRODUCTS AND SERVICES FROM IMC

- Phosphate Rock
- Triple Superphosphate (Coarse, Granular, Run-of-pile)
- Phosphoric Acid
- Muriate of Potash (Coarse, Standard, Granular)
- Sulphate of Potash
- Sul-Po-Mag

Manufacturing and Technical Service
Transportation Service
Customer Service
Management Services
Marketing Services

INTERNATIONAL'S
FULL ORBIT
SERVICE

IMC research continually strives for new ways to make quality control methods even more precise.

Recognizing that performance and success of mixed fertilizers hinge on superior basic materials, every effort at IMC is directed toward supplying customers with ingredients of consistently high quality . . . it makes your IMC representative a . . .

MAN WITH A PRODUCT MISSION

To give customers the ingredients that surpass the most rigid specifications, IMC quality control starts right at the mine. Each product is carefully checked through every stage of production — recovery, blending, drying, grinding and loading.

For example: IMC control specialists conduct 57 sample tests an hour on phosphate — practically a "test-a-minute" — totaling 468 separate quality checks every working day. This continuous program has one objective: high-grade uniformity on all finished ingredients.

In addition to such detailed quality control, IMC's Man with a Product Mission is backed up by more than 50 years' successful experience in supplying the fertilizer industry . . . by vast resources to mine and produce phosphates, phosphoric chemicals, potash and potash compounds. Huge operations at Bonnie, Florida; Norlyn, Florida; Carlsbad, New Mexico; and more recently in Saskatchewan, Canada, put IMC in a leading position to meet the product needs of its customers with ingredients that have the chemical and physical characteristics today's formulas demand.

It adds up to this. Your IMC Man with a Product Mission knows the fertilizer business inside and out. He knows what is important to you, the manufacturer, and what your products must do to satisfy your customers.

Above all IMC's Man with a Product Mission knows that consistently dependable quality in ingredients is of first importance. Through IMC's program of total service he makes sure his customers get them. His mission is your success. Just give him a call.

Products for growth*

IMC

*Trademark

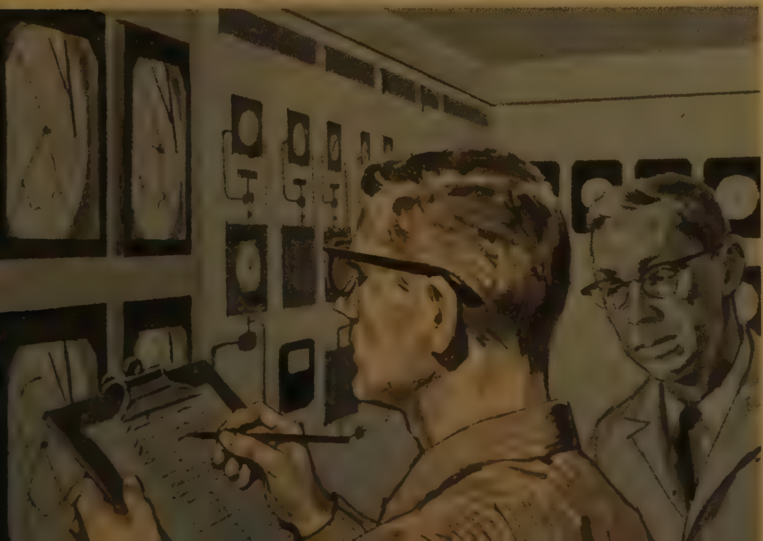
AGRICULTURAL CHEMICALS DIVISION

INTERNATIONAL MINERALS & CHEMICAL CORPORATION

Administrative Center: Skokie, Illinois

6-60

Quality control also shows IMC production specialists that all production steps are in balance, the product accurate.



IMC ingredients are analyzed in final form to assure physical and chemical specifications are met before shipping.

CHEMICALS FOR FORMULATORS

ALDRIN 25-DB
ALDRIN 25-W
ARAMITE 25-DB
ARAMITE 25-W
BHC 12-DB
BHC 12-W
BHC 18-DB
BHC 26 Gamma
(Pelletized)
CHLORDANE 40-DB
CHLORDANE 40-W
CAPTAN 50-W
DDD (TDE)
DDT 50-DB
DDT 50-W
DDT 75-W
DDT TECHNICAL
DIELDRIN 50-DB
DIELDRIN 50-W
ENDRIN 50-DB
ENDRIN 50-W
HEPTACHLOR 25-DB
HEPTACHLOR 25-W
KARATHANE 25-W
LINDANE 75-W
LINDANE 25-W
MALATHION 25-DB
MALATHION 30-DB
MALATHION 35-DB
METHYL PARATHION TECHNICAL
METHYL PARATHION 25-DB
NEMAGON 26 GRANULAR
NEUTRO COP 53
PARATHION 25-DB
PARATHION 25-W
PHALTAN® 75-W
ROTENONE (Cube Powder)
SULFURS
TOXAPHENE 40-DB
TRITHION® 25-DB
ZINEB 65-W

®Registered trade-mark.

All of the above materials may not be available from Stauffer in every region. For information, write or phone the Stauffer regional office nearest you.

Look to Stauffer for these basic materials

If you are formulating agricultural chemicals, it will pay you to check your requirements with Stauffer.

One reason is that Stauffer is in a position to supply *many* basic materials, technicals or concentrates.

Another is the strategic location of Stauffer plants, and our ability to move materials to you in a hurry on short notice.

And still another advantage is the technical assistance on formulating, labelling and packaging which Stauffer can and will gladly supply upon request.

STAUFFER CHEMICAL COMPANY

380 Madison Avenue, New York 17, N. Y.
(Phone: OX 7-0600)

Glendale, Ariz.
P. O. Box 505
Phone: YE 7-8921

San Francisco, Calif.
636 California Street
Phone: SU 1-5350

So. Omaha, Nebr.
P. O. Box 222
Phone: OR 3200

North Little Rock, Ark.
P. O. Box 509
Phone: FR 4-7445

Tampa, Florida
P. O. Box 5285
Phone: 4-3127

North Portland, Ore.
Suttle Road
Phone: AV 6-3675

Los Angeles, Calif.
824 Wilshire Blvd.
Phone: MA 7-5771

Harvey, La.
P. O. Box 127
Phone: FI 1-4208

Houston, Texas
Heights Station
P. O. Box 7222
Phone: UN 9-3333

Lubbock, Texas
P. O. Box 592
Phone: PO 2-8133

Weslaco, Texas
P. O. Box 495
Phone: WO 8-2112

Enlarged 50 times

This is probably the most unusual urea prill available in America today!

It's *uncoated!* It goes contrary to all the accepted ideas about prills! *To your advantage.*

These extraordinary uncoated prills are so made that you get much *less* moisture than with coated material. They're guaranteed to be free-flowing. You get better storage. You get *no* dust. And as to the nitrogen content, you get a guaranteed 46% nitrogen—at the same price as 45% material!

The producer of these superior urea prills? Carbochimique of Belgium. The sole agents in the United States—H. J. Baker & Bro., Inc.

For 110 years, the Baker organization has supplied the agricultural industry with what we always believe to be the best products. These urea prills are a case in point. As a first step to seeing how much better they do the job for *you,* why not write for a free sample today. Write our office nearest you.

H. J. BAKER & BRO., INC.
600 Fifth Avenue, New York 20, N. Y.

Established 1850

Branch Offices:

208 South LaSalle St.,
Chicago, Ill.

501 Jackson St.,
Tampa, Fla.

Savannah Bank Bldg.,
Savannah, Ga.

361 East Paces Ferry
Rd., N.E., Atlanta, Ga.

"These standard constructions, which have been thoroughly laboratory and field tested, offer users new opportunities for *real savings*," says Richard P. Kessler, manager of West Virginia's Multiwall Packaging Laboratory. Here Mr. Kessler (kneeling) supervises drop tests which show that the new WONDERWALL standard bag constructions can take four to five more drops without bursting than old style kraft multiwalls.

NEW!

WEST VIRGINIA'S 1960 STANDARD BAG CONSTRUCTIONS TO SAVE YOU MONEY

Major savings for fertilizer packers are being achieved by three new standard WONDERWALL bag constructions perfected by West Virginia.

During a controlled test to determine possible savings in bag costs, various WONDERWALL constructions were developed in our Multiwall Packaging Laboratory. They were tested by 101 packers who shipped 569,224 tons of fertilizer in 12,307,546 WONDERWALLS.

The three recommended standard constructions and their actual savings, as used in normal conditions, are shown in the box.

For example, where a typical 100# old fashioned kraft bag usually would require 1/90 AL, 2/40, 1/50 for a total of *four* plies, the new standard WONDERWALL provides the same or superior strength with *three* plies: 1/100 AL, 1/40, 1/50 . . . at a saving of $3.50 per M.

Secret of WONDERWALL's strength is Kraftsman Clupak*, the paper with the built-in stretch that withstands far more impact without breaking than conventional natural kraft multiwalls. In a WONDERWALL bag, fewer plies are needed to do the job!

See how WONDERWALL standard bag constructions can *cut your costs, increase your profits.* Our technical service experts are ready to help you take full advantage of these new bag developments; call or write Multiwall Bag Division, West Virginia Pulp and Paper Company, 230 Park Ave., New York 17, N.Y.

**Clupak, Inc.'s trademark for extensible paper manufactured under its authority.*

West Virginia
Pulp and Paper

NEW STANDARD WONDERWALL FERTILIZER BAG CONSTRUCTIONS

Pounds Packed	Old Style Natural Kraft Construction	New Wonderwall	Actual User Savings
100#	1/90AL, 2/40, 1/50	1/100AL, 1/40, 1/50	**$3.50/M**
80#	1/90AL, 2/40, 1/50	1/100AL, 1/40, 1/50	**$3.10/M**
50#	1/90AL, 1/40, 1/50	1/100AL, 1/60	**$3.80/M**

Smith-Douglass Co., Inc., Norfolk, Va., has shipped over 50,000 tons of fertilizer and related products in a million new WONDERWALL 100# standard construction bags. They report excellent results with a saving of $3.50 per M and reduced bag breakage.

THEY MOVE MOUNTAINS TO SHIP CARLOADS

Cyanamid literally moves mountains of high-grade phosphate ore to ship carloads of Trebo-Phos . . . the triple superphosphate with controlled porosity.

To ship you the highest quality triple superphosphate, Cyanamid's "walking giants" scoop up twenty-four ton bucketfuls of high-grade phosphate ore at the rate of one ton every one and six-tenths seconds. To make one carload of TREBO-PHOS*, approximately 340 tons of ore are mined. This tonnage dwindles as the ore is washed, screened, graded and dried. Much of the remaining is used to make highly concentrated phosphoric acid which, when added to fine rock, makes triple superphosphate. Quality is checked at every stage . . . the result: a triple with controlled porosity.

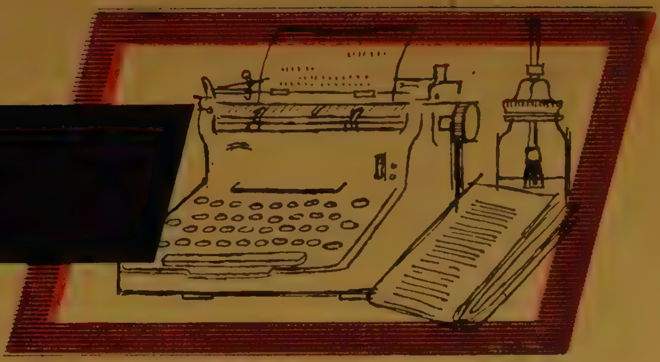
Its characteristic: ammoniation rates as high as 5% without evolution of ammonia fumes, yet TREBO-PHOS particles will not take on excess amounts of moisture. The finished product is a dry, drillable, well-conditioned fertilizer. American Cyanamid Company, Agricultural Division, New York 20, N. Y. **TREBO-PHOS is American Cyanamid Company's trademark for its triple superphosphate.*

CYANAMID

TREBO-PHOS
TRIPLE SUPERPHOSPHATE

CYANAMID SERVES THE MAN WHO MAKES A BUSINESS OF AGRICULTURE

EDITORIALS



THE agricultural insecticide industry currently finds itself in the unfortunate position of being caught "in the middle" in a bitter interdepartmental government controversy between the Food and Drug Administration and the U. S. Department of Agriculture. And, unfortunately, those in the middle of such tangles as this often catch the brickbats from both directions.

The quarrel has been building up for some time, it has been apparent to observers. Secretary Flemming brought the battle out into open a couple months back with his attack on "tainted" cranberries. Many insiders expressed the opinion when the cranberry ban was instituted that the timing,—just a few weeks before Thanksgiving—and the small size of the group of growers affected, made it appear that Secretary Flemming was using this as sort of a test action, or trial balloon attack, to be followed up with a heavier blast directed at bigger game, if public reaction to and outcome of the first engagement proved favorable.

The latest move by the Secretary in rescinding the previous tolerance on heptachlor is definitely a major threat to producers and users of pesticides. Although by F.D.A.'s own admission there is no immediate health hazard, an arbitrary action has been taken which will, if it is not reversed, deny growers the assistance of this and other important pesticide aids, without which the Secretary of Agriculture states many foods cannot be produced in sufficient quantity to meet the Nation's needs. Incidentally, the insecticide industry has powerful allies in defending itself against this "witch hunt." Not only the Secretary of Agriculture, but also farm groups much more potent politically than the small group of cranberry growers are on its side.

What seems to be called for, at once, is a decision farther up the line in the executive branch of the government to resolve this interdepartmental conflict before serious casualties result. If Agriculture and Food and Drug cannot themselves work out a joint policy that will allow for the safe and effective use of indispensable pesticide chemicals, then someone up the line will have to blueprint such a policy for them. These chemical aids are the essential tools which the American farmer has used to build an agricultural abundance which has made us the strongest nation in the world.

A TREMENDOUS increase in consumption of fertilizer is reported for the crop year 1958-1959. (See pg. 30 of this issue). Advancing almost 12% from the total for the previous year, fertilizer sales reached the record total of 25,143,000 tons. The biggest percentage increase was in the West North Central region, (26.9%) but there were also large increases in use in the South Atlantic and the Pacific regions.

U.S.D.A. workers credit much of the gain to increased acreage of certain crops and State soil fertility programs. Increases in consumption of fertilizer, they observe, were the highest in those areas in which increases in planted acreage of cotton and corn were highest.

Just how much of the credit for the expanded market can be laid at the door of the National Plant Food Institute will never, we suppose, be quite clear. But, it is significant to this observer that the N.P.F.I. program to expand fertilizer sales started just about a year before the big gains in fertilizer use appeared.

NW Agricultural Chemicals Conference

Serious problems predicted in grasshopper control this year. Populations may run high, yet growers will be told to use materials less effective than heptachlor,—which no longer can be recommended. What will the farmer do?

Baker of Washington Department of Agriculture tells industry it must do a better public education job,—to forestall hysteria concerning its products. "Wean the 'do gooders' who are looking for a cause to champion."

FAILURE of the federal Food and Drug Administration to consider the possibility of thresholds in human resistance to possible cancer-inducing chemicals was scored by Dr. H. S. Telford, chairman of the department of entomology, Washington State University, Pullman.

Speaking at the 7th annual Northwest Agricultural Chemicals industry conference in Portland, Ore., Jan. 21, he pointed out that all of pharmacology is based on thresholds of human tolerance to medicine and that thresholds are everywhere in human diets.

"I personally feel that the Delaney clause should be aggressively challenged," Dr. Telford declared. "We need to look at the matter of pesticide residues in a more practical manner."

Legislators should think more of the probable spread of disease by insects than of the possible harm to health from pesticides, he remarked in conclusion. This idea was reiterated by various speakers during the week-long session of scientists and industry men in the meetings which have developed around the Western Spray conference.

Problems of controlling vegetable pests were considered during the 19th annual Pacific Northwest Vegetable Insect conference Jan. 18-20. Virus diseases and means of combatting them were considered at the same time at the Western Small Fruits Virus conference.

Granddaddy of them all is the 34th annual Western Cooperative Spray project, generally known as the Spray conference, that met Jan. 20-22. At this gathering scientists exchanged ideas on control of deciduous fruit pests, then revealed their findings to industry men the final day.

Variations in results obtained with the same chemicals in different parts of the West were emphasized in the closing minutes of the final session when several research workers told how one of the pesticides was either a "dead duck" or still quite effective.

John A. Quist, Austin, Colo., Western Colorado experiment station, reported that from six to eight cover sprays were required to control codling moths and that they had long since ceased using DDT. "Malathion and parathion are also dead ducks as far as we are concerned," he declared. Diazinon, however, is successful, but there are some stings.

Guthion and Sevin are the only two pesticides western Colorado orchardists can depend on, "and the mite problem is tough with Sevin," Quist commented in conclusion.

Fred P. Dean, USDA researcher stationed at Yakima, Wash., told the industry men that no one pesticide was used as a straight program in that area, although Sevin, Guthion and Diazinon sometimes came close to it. "We're just about through with DDT for codling moths," he added.

On the other hand, Dr. Stanley C. Hoyt, Tree Fruit experiment station assistant entomologist, and Ezra Crist, fieldman, both from Wenatchee, Wash., reported that DDT had proved satisfactory, particularly when combined with parathion. Dr. Harold F. Masden, Berkeley, University of California entomologist, agreed, but added that where growers believed they were finding more wormy fruit than they expected, they should change to another insecticide.

Some cases of resistance have appeared in the California orchards, and tests have shown that where growers depended entirely on parathion, no control was obtained.

McDaniel mites, part of the two-spot complex, proved particularly troublesome in some orchards during 1959 because they developed resistance to practically all miticides. Kelthane remains effective, as does Tedion, but because the latter has not received federal clearance, it cannot be recommended, speakers commented.

The question was raised of what the Food and Drug administration would do about the use of chemicals in other parts of the country when they had a label clearance for a limited area. David H. Brannon, Washington state extension entomologist, brought up the matter concerning Maneb, which has been approved for use on cranberries in New Jersey.

Washington state is reluctant to suggest use of the material until the point is clarified, Brannon remarked.

Use of oils in insect pest control is regaining attention of entomologists in the West. Oils have proved effective against pear psylla in prebloom applications, according to Dr. Everett Burts, Wenatchee, Wash., Tree Fruit experiment station assistant entomologist. Preliminary work in California also looks promising, Dr. Masden commented, but there are many questions remaining unanswered.

Phytotoxicity has not been worked out, for example. Oil with Tedion produced no harmful effect on pears, and oil with Ethion and several other pesticides seemed harmless, but not much is known yet about what oil will do in regard to residue on the fruit crops.

One of the major limitations of petroleum oil sprays as pointed out by Dr. Louis G. Gentner, Medford, Ore., superintendent of the southern Oregon experiment station, is the lack of residual action. Oil will wipe out mites, but in the Medford area, two-spots drift in continuously for a month and a half during the growing season.

"We get a beautiful clean-up of mites with oil," Dr. Gentner reported, "but on the fourth day after spraying we find adults ovipositing. We need something with longer effect. Each area has its own problems with a different situation." Dr. Gentner also pointed out that orchardists would have difficulty if they used DDT or Sevin following oil application.

"Don't put on Captan after you've used oil," interjected Dr. Roderick Sprague, Wenatchee, Wash., Tree Fruit experiment station plant pathologist.

Dr. Harry J. O'Reilly, University of California plant pathologist, outlined findings of scientists in his section when the open meeting of the spray conference was held. Fruit russetting in northern Washington caused by apple powdery mildew was practically eliminated by the better sprays, including Karathane and Karathane EC, Polysulfide compound, Phytoactin and Niagara 5943.

Russetting caused by mildew on fruit in the state of Washington near the Canadian border was particularly bad in 1959 where mildew was uncontrolled, according to Dr. Sprague. He commented that the two last- named fungicides require further testing, and that Niagara 5943 "is somewhat risky to use."

Cyprex provided excellent control of apple scab in British Columbia, Dr. D. L. McIntosh of the plant pathology section, Summerland research station, revealed. Niagara 5943 not only provided good control of scab, but it also was toxic to certain aphids and mites (not identified).

Surprising and unexplained variations in results with tests of fungicides in two orchards south and west of Portland were reported by Dr. Ian C. McSwain, Corvallis, Oregon State college plant pathology specialist. In efforts to control brown rot blossom blight and brown rot of fruit, eight different fungicides were applied three times between April 7 and May 1.

Ferbam, Maneb and Captan did the best in one orchard, reducing rot in the fruit to one-third or one-half of that on check trees, where it amounted to 27.4%. On trees sprayed with another fungicide, the rot amounted to 31%.

- **Malathion, parathion are 'dead ducks' for codling moth — says Colorado investigator.**
- **Guthion and Sevin called the only materials western orchardists can rely on.**
- **Cyprex offers excellent control of apple scab.**

In the other orchard, where rot on the check trees was only 16.2%, Maneb, Phygon and Ziram (both untested in the previous orchard) as well as Captan held rot in fruit to under 10%. TAG and PAS were suspected of burning blossoms so that there was not enough fruit on those trees for a comparable count.

Dorlone, No. 18133 Promising

VEGETABLE pests, as reported on, covered a wide range —considered either literally or figuratively. Symphylids have reduced some of Oregon's most fertile soils to marginal land, so continue to be one of the state's most important economic pests. Fall-seeded wheat and oats in western Oregon and potatoes near the Idaho border are the newest reported hosts.

Soil fumigants applied according to directions will control this still mysterious foe. Recommended dosages (on a per acre basis) include: D-D mixture (30 gal.), Telone (30 gal.), 50% Nemagon (5 gal.), Vapam (20 gal.) and 85% ethylene dibromide (10 gal.).

Promising results have been obtained with American Cyanamid 18133 applied at the rate of 27½ pounds per acre. Also, 25 gal. per acre of Dorlone, a mixture of Telone and EDB, showed promise last year.

Soil insecticides should be applied annually to control tuber flea beetles in potatoes in Oregon although test plots at Oregon State college show that when aldrin and dieldrin are applied at the rate of 10 lbs. per acre, commercial control continues for at least 11 years. (That was when the insecticides were first mixed in the soil in the test plots.)

In British Columbia, where 90% of the potatoes in check plots were damaged by the beetles—and 35% were unmarketable for table use—good control was obtained this past season with aldrin EC at 4 lbs. per acre.

(*Continued on Page* 100)

Direct Application Materials Total 9 Million Tons

Table 1.--Fertilizers consumed as mixtures and as materials, year ended June 30, 1959, compared with consumption of previous year, by State and region[1] (Preliminary)

State and region	Mixtures	Materials[2]	Total	
			Consumption	Change from year ended June 30, 1958
	1,000 tons	1,000 tons	1,000 tons	1,000 tons
Maine	171	8	179	3/
New Hampshire	17	4	21	1
Vermont	46	20	66	8
Massachusetts	72	18	90	3
Rhode Island	15	2	17	-1
Connecticut	55	21	76	-3/
New England	376	73	449	12
New York	547	80	627	-9
New Jersey	213	26	239	23
Pennsylvania	585	74	659	17
Delaware	88	5	93	10
District of Columbia	4	1	5	1
Maryland	297	20	317	40
West Virginia	65	11	76	2
Middle Atlantic	1,799	217	2,016	84
Virginia	685	111	796	90
North Carolina	1,367	387	1,754	243
South Carolina	640	251	891	158
Georgia	1,151	317	1,468	210
Florida	1,293	172	1,465	4
South Atlantic	5,136	1,238	6,374	705
Ohio	977	113	1,090	36
Indiana	917	256	1,173	91
Illinois	618	924	1,542	89
Michigan	648	86	734	85
Wisconsin	416	58	474	34
East North Central	3,576	1,437	5,013	335
Minnesota	389	153	542	99
Iowa	434	261	695	153
Missouri	531	402	933	177
North Dakota	39	92	131	24
South Dakota	13	27	40	5
Nebraska	43	259	302	70
Kansas	94	196	290	93
West North Central	1,543	1,390	2,933	621
Kentucky	477	107	584	52
Tennessee	464	128	592	78
Alabama	802	275	1,077	130
Mississippi	309	382	691	59
East South Central	2,052	892	2,944	319
Arkansas	163	190	353	62
Louisiana	160	130	290	13
Oklahoma	71	63	134	27
Texas	291	374	665	-2
West South Central	685	757	1,442	100
Montana	4	38	42	3
Idaho	13	110	123	15
Wyoming	2	14	16	3
Colorado	14	72	86	4
New Mexico	5	38	43	3
Arizona	28	165	193	-16
Utah	5	42	47	7
Nevada	2	4	6	-15
Mountain	73	483	556	5
Washington	47	195	242	-5
Oregon	33	168	201	8
California	335	4/ 2,255	2,590	416
Pacific	415	2,618	3,033	419
Total	15,655	9,105	24,760	2,600
Hawaii	54	84	138	16
Puerto Rico	212	33	245	11
United States: 1958-59	15,921	5/ 9,222	25,143	2,627
1957-58	14,353	5/ 8,163	22,516	0
1956-57	14,703	2/ 8,006	22,709	193

1/ Due to rounding, column or cross totals may not balance. 2/ Includes: ground phosphate rock and colloidal phosphate, basic slag, secondary and trace nutrient materials, as borax, metallic salts, sulfur, gypsum, etc. used as separate materials. Does not include liming materials or the quantity of materials used in manufacture of commercial mixtures. 3/ Less than 500 tons. 4/ Includes an estimated 270,000 tons of dried manures. 5/ includeS Materials not guaranteed to contain N, P_2O_5, or K_2O amounting to 1,214,000 tons in 1958-59, 939,728 tons in 1957-58, and 943,243 tons in 1956-57.

Preliminary Report on Consumption of Commercial Fertilizers *and* Primary Plant Nutrients in the United States

Year Ended June 30, 1959

Largest increase in fertilizer consumption in history of the industry!

Total consumption up 11.7%, plant nutrients up 13.6%.

West North Central region leads other areas, with increase of 26.9%.

Fertilizer use in South Atlantic and South Central regions, which has steadily decreased since the peak year of 51-52, shows substantial increase for the 58-59 crop year.

By Walter Scholl, Marion M. Davis, Esther I. Fox and Caroline A. Wilker

Fertilizer Investigations Research Branch, Soil and Water Conservation Research Division, USDA, ARS, Beltsville, Maryland

A SUBSTANTIAL increase in the quantity of primary plant nutrients, as well as the quantity of fertilizer carriers consumed, over previous years was recorded in the United States during the year ended June 30, 1959. This relatively higher change in the pattern of consumption was related to the increased acreage of certain crops and State soil fertility programs.

The data are based on shipments of manufacturers, liquid nitrogen applicators, and State tonnage reports. Estimates of the nutrient contents are determined from average analyses of samples of products as reported by State fertilizer control officials. Data for Alaska and possessions of the United States were not available. Estimates from various sources indicate that their combined consumption is probably less than 8,000 tons which is not included in these totals.

Fertilizer — Consumption of fertilizer in the United States for the year ended June 30, 1959 increased substantially over the previous year (table 1). Total consumption was 25,143,000 tons — an increase of 2,627,000 tons (11.7 percent). It increased in all but seven States. In these, representing 1,827,000 tons or 7.3 percent of the total consumed in the United States, consumption was 49,000 tons below that of the previous year. Increases registered in the South Atlantic region were 705,000 tons (12.4 percent); in the West North Central region, 621,000 tons (26.9 percent), and in the Pacific region, 419,000 tons (16.0 percent). Substantially more fertilizer was also used in the East North Central and East South Central regions. More than one-half of the increase in consumption of fertilizer in the Pacific region was in the secondary and trace nutrient materials, principally gypsum. The total use of fertilizer in the South Atlantic and South Central regions which has steadily decreased since the peak consumption of 11,058,695 tons in 1951-52 consumed nearly that amount in this period.

Mixtures — Mixed fertilizers comprised 63.3 percent of the total tonnage of fertilizer consumed and amounted to 15,921,000 tons — an increase of 1,568,000 tons (10.9 per-

Table 2.--Principal grades of mixtures consumed in United States, year ended June 30, 1959[1] (Preliminary)

Grade	Consumption	Grade	Consumption	Grade	Consumption	Grade	Consumption
	1,000 tons		1,000 tons		1,000 tons		1,000 tons
0-10-20	89	4-8-10	83	5-20-20	980	8-12-12	72
0-14-14	199	4-8-12	145	6-4-8	64	8-16-16	199
0-20-20	284	4-9-3	52	6-6-6	90	8-24-8	53
2-12-12	302	4-10-6	121	6-8-6	104	8-32-0	60
3-9-9	461	4-10-7	306	6-8-8	253	10-6-4	78
3-9-18	85	4-12-8	102	6-10-4	87	10-10-10	748
3-9-27	59	4-12-12	1,228	6-12-6	67	10-20-10	212
3-12-6	71	4-16-16	448	6-12-12	478	12-12-12	889
3-12-12	615	5-10-5	450	6-24-12	222	14-0-14	63
4-7-5	92	5-10-10	1,624	6-24-24	162	14-4-10	70
4-8-6	62	5-10-15	340	8-4-8	53	Other[2]	3,286
4-8-8	93	5-20-10	106	8-8-8	214	Total	15,921

[1] Grades consumed in amounts of 50,000 tons or more.

[2] Approximately 1,650 grades.

Table 3.--Kinds of fertilizers consumed, year ended June 30, 1959, by region, in 1,000 tons1/ (Preliminary)

Kind	New England	Middle Atlantic	South Atlantic	East North Central	West North Central	East South Central	West South Central	Mountain	Pacific	Hawaii Puerto Rico	Total	
											Consumption	Change from year ended June 30, 1958
SS	376	1,799	5,136	3,576	1,543	2,052	685	73	415	266	15,921	1,568
AL NITROGEN MATERIALS	12	76	879	480	681	571	473	249	947	83	4,453	576
nia, anhydrous	0	3	29	80	170	61	146	45	140	1	676	93
nia, aqua	2/	2/	0	7	1	2/	7	25	359	49	448	83
nium nitrate3/	5	30	164	160	332	290	122	77	94	0	1,273	156
nium nitrate-limestone mixtures	2/	2	252	2/	2/	38	3	3	2/	0	299	35
um sulfate	2/	9	7	117	14	14	82	58	228	27	557	-20
ogen solutions	1	6	151	93	158	15	25	10	60	0	518	194
um nitrate	2	11	250	1	2/	145	57	2/	2/	2/	467	31
	2	5	3	17	5	1	23	18	28	6	107	9
r4/	1	10	23	5	1	7	9	13	38	2/	108	-5
L ORGANIC MATERIALS	27	40	32	46	17	2	7	7	329	2/	507	13
d manures	9	13	6	6	4	1	3	2	272	2/	316	15
ge sludge, all	6	17	9	29	7	1	2	4	49	2/	124	-10
age, all	3	8	6	1	2/	2/	0	2/	1	2/	19	1
r5/	9	2	11	10	6	2/	2	1	7	0	48	7
ATE MATERIALS	32	86	126	698	630	251	234	196	278	17	2,548	144
nium phosphate5/	2/	1	1	21	183	3	106	86	144	2	547	78
c slag	0	0	21	0	0	117	2	0	0	0	140	-5
um metaphosphate	0	1	3	6	23	16	2/	2/	2/	0	49	3
phate rock & colloidal phosphate	2/	7	18	529	238	17	20	2/	2	4	835	-17
rphosphate: 22% and under	29	71	76	50	46	87	61	16	89	5	531	53
" Over 22%	2/	2	5	90	140	11	42	86	28	4	408	34
r4/	2	4	3	2/	2/	2/	3	8	15	2/	39	-2
MATERIALS	3	9	85	207	52	64	39	3	14	13	488	40
ssium chloride	2	7	40	203	51	48	37	2	7	11	407	42
r4/	1	2	45	4	1	16	2	1	7	2	81	-2
Y NUTRIENT FERTILIZERS	449	2,009	6,258	5,007	2,923	2,940	1,439	528	1,983	380	23,917	2,353
ARY & TRACE NUTRIENT MATERIALS	2/	4	116	4	3	4	3	28	1,050	3	1,214	274
um	2/	3	114	1	2/	3	2/	22	1,005	0	1,149	259
r4/	2/	1	2	3	2	1	3	6	45	3	66	15
ASSIFIED	0	3	0	2	7	0	0	0	0	0	12	---
RTILIZERS	449	2,016	6,374	5,013	2,933	2,944	1,442	556	3,033	383	25,143	2,627

[1]States comprising the regions are listed in table 1. Due to rounding, totals of items may not dd to column or class totals. [2]Less than 500 tons. [3]Undetermined quantities may have been sed for non-fertilizer purposes. [4]Includes quantities undesignated by kind. [5]Includes all re- orted quantities of grades: 11-48, 11-50, 13-39, 16-20, 20-52, 21-53, and 27-14.

Table 4.--Primary plant nutrients consumed in regions and United States as mixtures and as direct-application materials, by kinds, year ended June 30, 1959, in 1,000 tons1/ (Preliminary)

Kind	New England	Middle Atlantic	South Atlantic	East North Central	West North Central	East South Central	West South Central	Mountain	Pacific	Hawaii and Puerto Rico	United States
						Nitrogen					
S	29	105	251	228	129	101	56	10	45	33	987
LS	5	26	220	190	343	189	226	108	329	20	1,656
ia, anhydrous	0	3	24	66	140	50	120	37	115	1	555
, aqua	2/---	---	0	2	---	---	1	5	71	10	90
ium nitrate	2	10	55	54	112	98	41	26	32	0	430
ium nitrate-limestone tures	---	---	52	---	---	8	1	1	---	0	62
ium sulfate	---	2	2	24	3	3	17	12	48	6	117
um cyanamide	---	2	2	---	---	2	2	---	2	0	9
al organics	1	2	2	2	1	---	---	---	6	---	14
gen solutions	---	2	38	31	57	4	8	3	14	0	157
hate products	---	---	---	3	27	1	16	14	24	1	85
sium products	---	---	2	---	---	---	---	---	0	---	2
m nitrate	---	2	40	---	---	23	9	---	---	---	75
	1	2	1	8	2	1	10	8	13	3	49
chemical nitrogen products	---	1	2	1	---	---	---	2	5	---	11
Total nitrogen	34	131	471	418	472	290	282	118	374	53	2,643
						Available P_2O_5					
S	44	214	481	580	292	233	111	13	47	16	2,031
	7	18	23	84	155	45	61	72	76	4	545
ium phosphates	---	1	---	10	60	1	27	25	35	2	160
slag	0	0	2	0	0	10	---	0	0	0	12
um metaphosphate	0	---	2	4	14	10	---	---	---	0	30
al organics	1	1	1	1	1	---	---	---	6	---	11
hate rock and colloidal osphate3/	---	---	1	16	7	---	1	---	---	---	25
phosphate: 22% and under	6	15	15	10	9	17	13	3	17	1	105
" over 22%	---	1	3	42	65	5	19	39	12	2	187
phosphate products	1	1	1	---	---	---	1	5	6	---	16
Total available P_2O_5	51	232	504	664	447	278	172	85	123	20	2,576
						K_2O					
S	46	196	554	546	194	227	73	3	30	33	1,902
LS	2	5	31	126	31	33	23	2	15	7	275
al organics	---	---	---	1	---	---	---	---	8	---	10
ssium chloride	1	4	24	124	31	29	22	1	4	7	247
potassium products	---	1	7	1	---	4	1	---	3	1	19
Total K_2O	48	201	585	672	225	260	96	5	45	40	2,177
TOTAL: N, avail. P_2O_5, K_2O											
1958-59	133	564	1,560	1,754	1,144	828	550	208	542	113	7,396
1957-58	129	539	1,366	1,569	886	726	497	196	501	103	6,512
1956-57	125	536	1,386	1,495	819	786	477	163	452	138	6,377

States comprising the regions are listed in table 1. Due to rounding, totals of items may not add to column or class totals.

Dashes (---) represent quantities less than 500 tons.

Represents 2 percent of the colloidal phosphate and 3 percent of the phosphate rock.

cent). This is the first year since 1952-53 that mixtures have shown an increase and the total establishes a new peak in consumption. Regions in which the principal increases occurred followed closely those Regions having corresponding changes in consumption of all fertilizers.

There were 46 grades consumed in amounts of 50,000 tons or more, totaling 12,635,000 tons — accounting for nearly 80 percent of the tonnage of mixed fertilizers consumed and approximately 1,650 other grades accounting for the remaining 20 percent in 1958-59. The 46 grades are listed in table 2. While consumption of most of the 46 grades increased, six grades — 4-12-12, 5-10-10, 5-10-5, 5-20-20, 6-12-12, 12-12-12—represented nearly 60 percent of the total increase in consumption of mixed fertilizers. These are the grades generally consumed in largest tonnages throughout the central and southeastern States.

Materials — The consumption of direct application materials amounted to 9,222,000 tons comprising 36.7 percent of all fertilizers consumed in the year ended June 30, 1959. Included in this tonnage are 7,996,000 tons of products containing one or more of the primary plant nutrients, 1,214,000 tons of products containing only secondary and trace nutrients, and 12,000 tons of products not classified (table 3). The consumption of materials containing primary nutrients increased 785,000 tons (10.9 percent) and secondary and trace nutrient materials 274,000 tons (29.2 percent) from the respective quantities in 1957-58. The change in consumption of direct application materials corresponded closely with the change in consumption of mixed fertilizers in most all of the Regions.

More than 73 percent of the increase in consumption of the primary nutrient materials was in the class of chemical nitrogen materials. Consumption of this class was 576,000 tons (14.8 percent) more

(*Turn to Page* 120)

WISCONSIN PESTICIDE CONFERENCE

Heptachlor and aldrin are on the Wisconsin 1960 recommendations for control of soil insects on corn, although zero tolerances have been set for these materials and their epoxides. Wisconsin researchers are convinced the chemicals will not move from the soil into the above ground portion.

Other 1960 recommendations include: methoxychlor for spittlebug control on alfalfa; parathion on grasshoppers; and malathion for hornfly control.

Heavy emphasis laid on importance of following instructions, and avoiding misuse of approved pesticides.

A varied and comprehensive program of practical talks on various types of pesticides and their recommended applications on crops of the area was presented at the 14th annual Wisconsin Pesticide Conference, held January 6 and 7 at Wisconsin Center, Madison, Wis. In the light of the recent cranberry debacle, considerable emphasis was placed at this year's session on the exceptional importance of following instructions and avoiding misuse of approved pesticides.

In a talk "Why Follow Pesticide Recommendations", Malcolm Dana, Department of Horticulture, Univ. of Wisconsin, called for: withholding findings from popular distribution until label clearances have been granted; withholding unregistered pesticides from use in demonstration plots; greater discretion on the part of pesticide dealers and the withholding of materials from prospective purchasers where the dealer suspects that the material will be used in a manner not specified on the label.

Emphasizing the same theme, H. Halliday warned that those concerned with the sale and use of pesticides would do well to exercise considerable care with experimental use of pesticides. He observed that the Wisconsin Dept. of Agriculture is "quite sensitive about milk or other foods which might reach the market contaminated with materials used experimentally, as well as with foods contaminated through abuse of recognized materials and failure to follow recommendations and directions." Experimental pesticides, he stressed, can be sold only after the seller has obtained a written permit from the department, and extreme care must be used in the employment of experimental materials. He also added a strong warning against the breaking of original containers of pesticides and selling them in bulk.

In a discussion of vegetable insect problems by R. K. Chapman, E. B. Radcliffe and J. K. Knoke of the Dept. of Entomology, Uni. of Wis., it was observed that "the development of resistance to insecticides among vegetable crop pests is the major control program at the present time in Wisconsin." Four major vegetable crop pests in the area are involved; the imported cabbageworm and cabbage looper on cabbage; the potato flea beetle on potatoes; and the onion maggot on onions. In view of the development of resistance, more attention is currently being given to the study of insect-resistant varieties of the vegetables affected, and to systemic pesticides. Work over the past three years has indicated that systemic insecticides are particularly well adapted for use with potatoes. On potatoes, the organophosphates have been found to be most effective when placed on each side of the potato row, in the fertilizer bands. Deposition of the pesticide has been accomplished by impregnating the fertilizer with it, or by using a granular distributor mounted on the planter to deliver a uniform flow of granular toxicant to the soil.

For the control of soil insects attacking corn, Wisconsin will recommend both heptachlor and aldrin for use in 1960, said J. W. Apple, Dept. of Entomology, Univ. of Wis., in a discussion of "Some Soil Insect Control Problems in Corn". In spite of the fact that zero tolerances have been set for both materials and their epoxides on corn, there is no evidence, Mr. Apple stated, "that any of these four chemicals will move from the soil into the above ground portion

The Industry Committee which helped organize the 14th Wisconsin Pesticide Conference. (l. to r.) Verle Paull, Farmrite Sprayer, Inc., Juneau, Wisc., (Chairman for 1961); Gene Walgenbach, Mammoth Springs Canning Co., Oakfield, Wisc., (Chairman for 1960 meeting) and E. Mercer, Spraying Systems Co., Milwaukee.

of corn and leave a measurable residue at harvest time".

Over the past year apple insect and mite control investigations were continued, with emphasis on the development of a more effective, economical and simplified control program. Among the pesticides under test in the Door County Orchards were Genite, Mitox, Tedion, Sevin, Diazinon, Guthion, and other older products. It was indicated that, based on findings from 1959 studies, the 1960 apple insect and mite control recommendations will remain essentially unchanged.

The 1960 cherry recommendations, it was stated, will also be essentially the same as those for 1959 except for minor changes in regard to the control of the eye-spotted bud moth. J. Duain Moore reported on "Cherry Spray Schedules and Food Quality," discussing the continuing program of test work which was initiated in 1949. The 1959 findings continued to confirm the general conclusions drawn from work carried out in previous years which Mr. Moore summarized as follows:

> Cherries sprayed with Bordeaux mixtures have been the smallest in size, but have shown the lowest can vacuum losses on storage, the highest drained weights, the highest per cent soluble and total solids, and have rated high in flavor preference by taste panels. They have shown poor color, however.
>
> Cherries sprayed with dithiocarbamates (ferbam, nabam) have been the largest in size, but show the greatest can vacuum losses, low drained weights, low per cent soluble and total solids, and have received low preference ratings in the flavor studies.
>
> Cherries sprayed with a complete schedule of Actidione at 2 p.p.m. have been small in size and usually have had the lowest pH and the best color. In some years, a bitter flavor has been associated with the use of this spray material.
>
> Recent results with Cyprex have been encouraging.

Methoxychlor For Spittlebug

DISCUSSING "Forage and Cereal Insects," J. T. Medler, Dept. of Entomology, Univ. of Wis., noted that treatments with Methoxychlor, Thiodan and a mixture of Heptachlor-Methoxychlor gave the best control of spittlebug. He warned, however, that unless a safe interval for Heptachlor is determined, that will be acceptable to the Federal Agencies for meeting a zero tolerance in milk, only Methoxychlor can be recommended for spittlebug control on alfalfa or red clover.

Reporting on insect control in second crop hay and pastures, Mr. Medler observed while Heptachlor has performed satisfactorily as a pesticide, no recommendation can be made for use of the material on hay or pasture until safe intervals are established, in view of action by the Food and Drug Administration last year in setting a zero residue tolerance for Heptachlor and Heptachlor epoxide on alfalfa. Satisfactory control of grasshoppers may be obtained by use of parathion, the speaker indicated. Pest control is accomplished by applications at a time when grasshopper nymphs have just hatched, and dosage should be ¼ lb. technical Parathion per acre. Parathion is recommended for application by custom applicators only.

Malathion Registered For Hornflies

DISCUSSING "Dust Treatments for Hornfly Control in Wisconsin," G. R. DeFoliart, Dept. of Entomology, Univ. of Wis., indicated that while Methoxychlor 50 per cent wettable powder and Malathion 4 per cent dust are approved by the Food and Drug Administration for use for Hornfly control on dairy cattle, their use in Wisconsin has not been permitted. Tests were conducted last fall to determine whether these two insecticides, when applied as dry powders, would be excreted in the milk of treated cows. Malathion was not detected in the tests, but Methoxychlor was found in the milk of all treated animals 30 to 44 hours after treatment. As a result of the tests, Malathion dust will be registered for hornfly control in Wisconsin but, for the time being at least, Methoxychlor will not be registered.

In a discussion of "Fly Control for the Dairy Herd," J. J. Tuss reported on tests of a series of cattle spray formulations which were made up with a lower pyrethrins and synergist content, but with higher than usual repellent content. The tests disclosed that up to about 25% of the pyrethrins and synergist in "standard" cattle sprays can be replaced by increasing the repellent content. Control obtained is about as good as the standard product and at a comparable cost. Mr. Tuss indicated that foggers are increasing rapidly in popularity for the application of cattle sprays, since they save both time and money.

Aerial Pesticide Application

W. G. LOVELY of the Agricultural Engineering Research Division, USDA, discussed, "Spray and Granular Application of Pesticides to the Soil." The use of granular formulations of pesticides has been highly successful,—with one of the distinct advantages being the fact that problems associated with mixing, water supply, and spraying are thus eliminated. In applications of granular pesticides to control the corn borer, studies showed that 1 pound of DDT granules was as effective as 1½ pounds of DDT spray. The residue on corn plants was 10 to 15 times greater with the spray than with the granular formulations.

Studies in aircraft application of granular pecticides for corn borer control indicate that it may be possible to apply such granular herbicides efficiently by air. The equipment and distribution patterns would be the same as for conventional insecticides.

D. C. Arny discussed, "Seed Treatment Materials for Small

(*Continued on Page* 107)

Role of Fertilizer in Changing the Agricultural Economy

The increased use of fertilizer by farmers since the beginning of World War II does not require any explanation in terms of the changing attitude of farmers toward fertilizer. It can be explained primarily in terms of relative price changes.

Fertilizer prices,—on a plant nutrient basis—have increased much less rapidly than have farm product prices. As a result, farmers have found it profitable to substitute fertilizer for land and other purchased inputs.

This article is a condensation of a report* by Vernon W. Ruttan and Calvin R. Berry, Purdue University and University of Arkansas, presented to the Indiana Fertilizer Conference, December, 1959.

CERTAINLY our agricultural economy has changed over the last decade. Perhaps the most dramatic evidence with respect to this change is the fact that while farm output now stands 24 per cent above the 1947-49 base period, domestic consumption of farm products is only 12 per cent above the 1947-49 base. Agricultural production has increased almost twice as rapidly as domestic consumption of farm products. Depending on how one evaluates the impact of weather, agriculture now has an over-capacity approximating 8 to 10 per cent of the 1958 output.

Another aspect of this change is the "agonizing reappraisal" of farm policy programs, and objections which have been forced by the production explosion of the last decade. The effectiveness of attempts to control farm output by limiting the use of land inputs are being questioned increasingly. The output expansion referred to above occurred during a period when crop acreage was being reduced by approximately 30 million acres, as a result of acreage allotment and soil bank programs. Thus we are gradually shifting our thinking away from the idea that increases in output imply fairly definite increases in "land requirements", to a point of view which recognizes that production factors such as land, fertilizer, improved seed, and certain types of capital equipment can be viewed as substitutes for each other.

The extent of this substitution is illustrated by a set of calculations based on a recent study of Central Indiana account farms. Our calculations indicated that on these farms a 25 per cent reduction in tillable acres would typically be accompanied by an output reduction of only slightly more than five per cent if, at the same time, other inputs per farm were held constant. Furthermore, fertilizer and seed could profitably be substituted for the land taken out of production up to the point where a 15-20 per cent reduction in tillable acres would result in no decline in farm output at all.

During the last two decades, fertilizer, improved seed varieties and improved insecticides have probably played the most important role as land substitutes in agriculture. During the next several decades, improvement in feed conversion and expansion of irrigation in humid areas can be expected to play increasingly important roles.

Future Fertilizer Consumption

It is difficult to indicate, of course, exactly how rapidly consumption of fertilizer will expand. In Table 1, we assume continuation of certain past relationships between the rate of growth of crop output and the rate of growth of

Table 1. Plant nutrient consumption, 1950 and 1956, and projections to 1965 and 1975 (in 000's of tons).*

	Amount	Index
A. Actual Consumption		
Year ending June		
1950	3,952	66
1955	5,995	100
1956	5,940	99
1957	6,239	104
1958	6,512	108
B. 1965 Projections Based on:		
(1) 1939-55 trend in plant nutrient use	8,510	142
(2) 1939-55 farm production—plant nutrient use relationship	7,550	126
(3) 1939-55 crop production—plant nutrient use relationship	7,430	124
C. 1975 Projections Based on:		
(1) 1939-55 trend in plant nutrient use	11,630	194
(2) 1939-55 farm production—plant nutrient use relationship	11,210	187
(3) 1939-55 crop production—plant nutrient use relationship	9,890	165

*For short run projections, see Richard A. King, "How to Predict Fertilizer Sales", *Plant Food Review*, Fall 1959, pp. 9, 10, 19-21.

---

*The research on which this paper (Purdue Agricultural Experiment Station Journal Paper #1565) is based was conducted under Purdue Agricultural Experiment Station Project 847. Work under Project 847 has also been reported in "Should Farmers Change Application Levels as Prices Change" *"Commercial Fertilizer and Plant Food Industry,"* February 1957 and in "Getting the Most For Your Fertilizer Dollar" *Economic and Marketing Information for Indiana Farmers*, May 29. 1958. A more complete report of this research is contained in Calvin R. Berry "An Economic Analysis of Fertilizer Marketing and Pricing With Particular Reference to Indiana" Unpublished Ph.D. thesis, Purdue Department of Agricultural Economics, January, 1958.

fertilizer use. On this basis we came out with 1975 fertilizer consumption in the U. S. at 65-94 per cent above the 1955 level.

The levels of fertilizer consumption projected for 1975 in Table 1 are well below the levels that would be used if farmers fertilized up to the levels indicated in soil test recommendations. Indications are that if farmers actually applied fertilizer at the levels indicated in soil test recommendations, fertilizer consumption would be almost triple the 1954 levels — roughly 50 per cent above the highest projection in Table 1.

Table 2. Farmer's level of technical knowledge concerning fertilizer analysis.

Tech. knowledge rating	No. farmers	%
I	166	55
II	51	17
III	59	20
IV	24	8

Table 3. Farmer's level of buying knowledge concerning fertilizers of hypothetical prices and analyses.

Buying knowledge rating	No. farmers	%
I	199	66
II	100	33
III	2	1

Whether these targets are actually met or not will depend on the answer to a number of important questions. Perhaps the most important question is — *will fertilizer prices continue to fall relative to farm products, land and other purchased prices?* The increased use of fertilizer by farmers since the beginning of World War II does not require any explanations in terms of the changing attitude of farmers toward fertilizer. It can be explained primarily in terms of relative price change.*

Fertilizer prices — on a plant nutrient basis — have increased much less rapidly than farm product prices. The prices of substitutes for fertilizer — land and other purchased inputs-have increased more rapidly than farm product prices. As a result, farmers have found it profitable to substitute fertilizer for land and other purchased inputs.

Whether fertilizer prices will continue to fall relative to farm product, land, and other purchased input, prices will depend in large measure upon the rate of technological change in the fertilizer raw material and processing industries. This depends primarily on the level of support which is given to research chemists, engineers and agronomists in the raw material processing section of the industry and in public institutions such as the USDA, the TVA and the colleges.

The Fertilizer Customer

The amount of fertilizer we sell in the future will depend also upon the kind of a marketing job that the people attending this meeting are able to do during the coming years. In the summer of 1956 Indiana made a rather intensive study of the fertilizer buying habits of farmers in three counties. Some of the findings are summarized in this review.

In an effort to measure the level of farmer's technical knowledge concerning fertilizer analysis and the farmer's fertilizer buying skill, farmers in the three sample areas were asked two questions.

First, they were asked to select from a list of diverse fertilizer

---

*See, for example, the reports of research Zvi Griliches, "The Demand for Fertilizer: An Economic Interpretation of a Technical Change" *Journal of Farm Economics,* Vol. 40, No. 3, August 1958, pp. 591-606 and "The Demand for Fertilizer in 1954: An Interstate Study" *Journal of the American Statistical Association,* Vol. 54, June 1959, pp. 377-384.

Table 4. First person normally contacted concerning a new fertilizer material or analysis and the reliability of information sources.

Source	Percent that were first contacted: Total	Percent that ranked first: Total	Order of reliability: Total
County Agent	44	54	1
Fertilizer Dealer	28	28	2
Vocational Ag. Teacher	0	2	5
Neighbors	14	11	3
Other	14	5	4

Table 5. Response to the question: "Why did you buy your fertilizer from (name of dealer from whom most recent purchase was made) this year?".

Item and classification	Total Number	Total Percent
Economic Factorss		
Convenience	61	20
Cheapest source	44	15
Dealer services	16	5
One dealer	16	5
Total economic factors	137	45

TABLE 5—Continued

	Total Number	Total Percent
Semi-economic factors:[a]		
Farm Bureau membership	36	12
Relative of dealer	18	6
Total intermediate factors	54	18
Non-economic factors:		
To accommodate fertilizer dealer	26	9
Brand loyalty	17	6
Dealer loyalty and habit	12	4
Total non-economic factors	55	19
Not classified:		
Other[b]	56	18
Not determined	1	*
Total not classified	57	18
Total	303	100

*Less than .05 per cent.

[a] Possibly contains both economic and non-economic elements.

[b] Includes quality of product, discounts, only source of liquids, dependability of dealer, etc.

analyses the one best analysis for use on potash deficient soils, on phosphate deficient soils, and on nitrogen deficient soils. *Secondly*, given two fertilizers of the same ratio but of different levels of analysis and selling at different prices, the farmers were asked to select the best buy.

The answers received to the first question revealed that 55 percent of the respondents selected the best analyses in each example and that more than two-thirds of the farmers rated in the top two knowledge groups (Table 2). Farmers rated somewhat higher on the second question (Table 3).

A rather startling result of the survey was that fertilizer customers do not rank the man they buy fertilizer from as the best source of information on new fertilizer material. In an effort to determine the sources of fertilizer information used by farmers and the order of reliability placed on these sources, farmers were asked to name the first source normally contacted concerning new fertilizer materials or fertilizer analyses. Slightly less than one-half of the farmers in each county named the County Agricultural Agent as their normal source of information on new fertilizer materials. (Table 4). County agents were followed by fertilizer dealers, neighbors and other sources, in that order. From a series of lists containing five categories of possible fertilizer information sources (County Agent, fertilizer dealer, vocational agriculture teacher, neighbors, and others), farmers were asked to rank the categories as to their reliability concerning a new fertilizer material or fertilizer analysis. The farmers in each county surveyed gave quite similar answers.

The finding poses a real challenge to fertilizer manufacturers to see that their dealers are well informed, and to fertilizer dealers to remain well informed in the characteristics of the materials they are handling.

(*Continued on Page* 109)

Secretary Benson Endorses Safe Use of Agricultural Pesticides as Essential In Production of Nation's Food Supply

A STRONG endorsement of the safe use of carefully tested agricultural chemicals was given by Agriculture Secretary Ezra Taft Benson in a public statement issued in Washington, January 14th. Stressing the important role of chemical fertilizers, insecticides, herbicides, fumigants, fungicides, etc., in American agriculture, the secretary said:

"These chemicals are as essential for efficient production of foods on the farm as are tractors, improved varieties of crops, and better breeds of livestock. They play as great a part in assuring consumers a continuing supply of nutritious and appetizing foods as do our modern methods of food processing and marketing.

"We cannot continue to produce adequate amounts of safe and wholesome foods without chemicals. Abandoning their use on farms and in the food industry would result in immediate decline in the quantity and overall quality of our food supply and cause a rapid rise in food prices paid by consumers.

"On our farms, chemicals enable us to produce the great variety of foods people want in the tremendous quantities needed. They also give indispensable protection to the natural excellence of these foods against the ravages of pests and diseases. In large part because of chemicals, American consumers enjoy fruits, vegetables, cereals, meat, poultry products, and milk of unexcelled quality and freedom from contamination."

The press of the country was quick to recognize in the Benson statement another turn in what the *New York Times* described as "a bitter inter-departmental fight over the use of chemicals in the production of foods." William H. Blair, in the January 20th issue of the Times, reported that "Officials of eleven farm and commodity organizations also jumped into the fight. They have begun an offensive against Secretary Flemming to prevent what they regard as his 'public scare tactics' in the tainted cranberry and poultry cases."

The farm groups, in a statement to the press indicated that they want the White House to create a public fact-finding body that will survey the use of agricultural chemicals and recommend changes in existing laws and procedures. Their proposal calls for setting up such a fact-finding body "to remove the daily threat of irresponsible public statements concerning agricultural chemicals and drugs and to provide a mechanism for the complete review of the problems in the field."

The *Wall Street Journal* referred to Secretary Benson's statement as a move which "appeared to be an attempt to head off a further toughening of Federal laws regulating the use of farm chemicals."

The Secretary's statement stressed the importance of pretesting of pesticides by the manufacturer, and care by the user, in the safe application of agricultural and food chemicals. "Years of experimentation and experience," he reminded, "show conclusively that the most profitable—as well as the safest — way to use chemicals in producing, processing, or market-

(*Continued on Page* 117)

FERTILIZER PRODUCTION

—as discussed at the Fertilizer Industry Round Table

(conclusion of a 3-part report)

No Nitrogen Losses in Wilson Toomer Plant

A REPORT stimulating considerable interest and examination was one presented by Albert Henderson on fertilizer processing at Wilson & Toomer Fertilizer Co., Jacksonville, Fla. Mr. Henderson maintains there are no nitrogen losses in his plant, (even in production of X-O-X grades). "Academically speaking," he said, "we lose perhaps 1.0 or 1.5% free ammonia, — however, this is not based either on analysis or inventory. For all practical purposes, there is no nitrogen loss. This is attested to by the absence of ammonia fumes in the near vicinity of the ammoniator stack".

In a general review of the production of fertilizer, Mr. Henderson advised that the solid raw materials are premixed in a conventional batch mixer because the resulting uniformity: (1) aids granulation; (2) aids analysis; and (3) frequently does not cost much, since many manufacturers already have the necessary equipment.

The continuous solid feed system is a batch weigh-time cycle —continuous belt type. It has been found very satisfactory at Wilson & Toomer, said Mr. Henderson, because "(1) it is accurate to ± 1%, (2) is readily checked visually, as well as by scale; and (3) is easily repaired by ordinary mechanics and maintenance men." The system requires considerable height (in some cases an elevator may be necessary) and is extremely dusty, — but this depends largely on the grade of fertilizer produced.

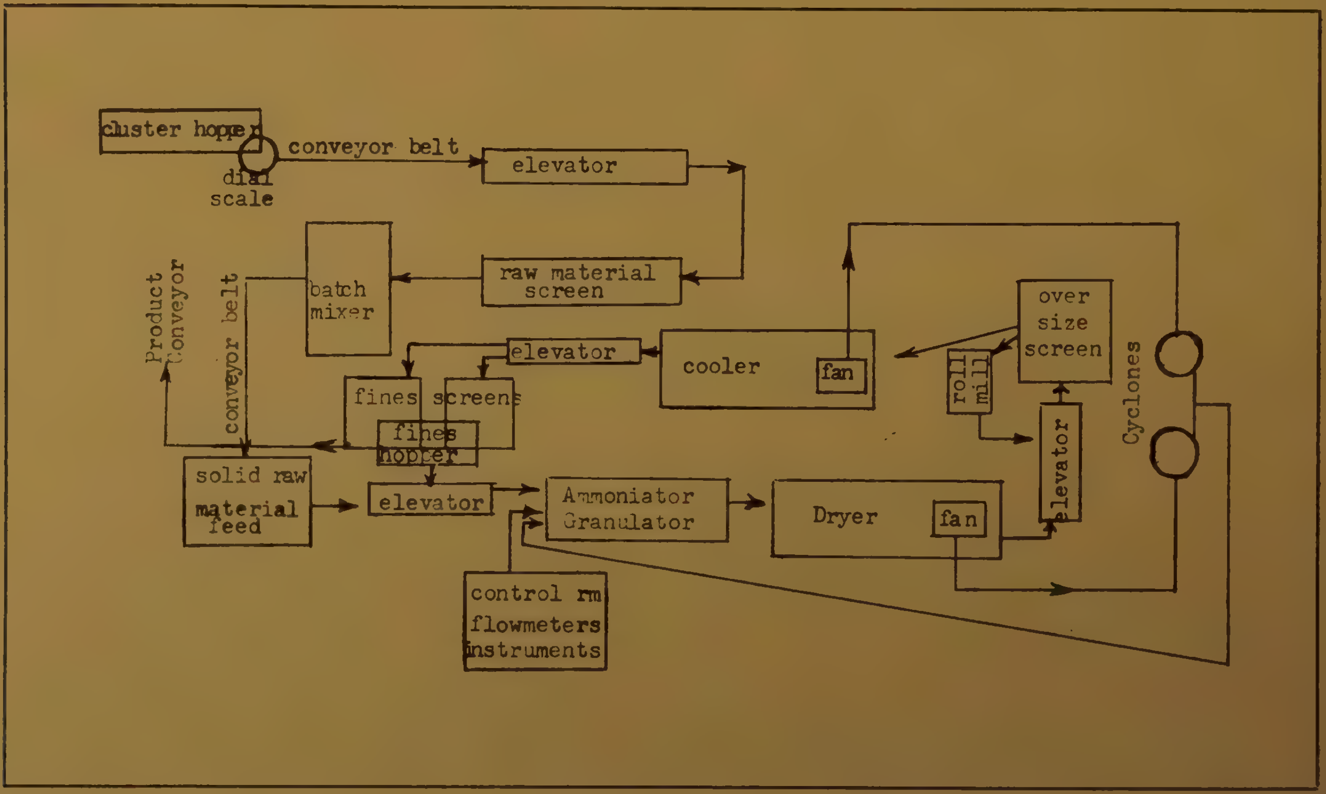
The biggest single problem, experienced when the push-through-air system was installed at the Wilson & Toomer plant, was build-up on the fan blades. Mounting the fans as close to the dryer and cooler as possible helped, but the most significant improvement was a change to specially designed fans, which minimize the build-up problem. In the improved blower system, the fan is mounted on top of the drier and cooler, whereas it was previously mounted between these two units. The fan is also located before the cyclone, and not after it, — as in some installations. Advantages of the improved system, cited by Mr. Henderson are:

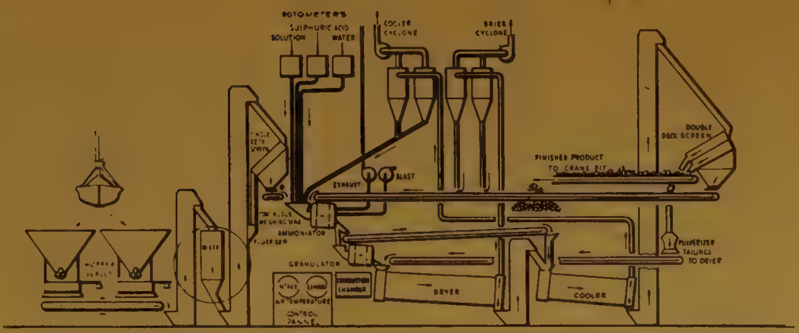
(1) Less duct work is required.

(2) Fans can be located at lower levels,—making them readily accessible.

(3) No gates or valves are re-

Flow diagram of operation at Wilson & Toomer Fertilizer Co., Jacksonville, Fla.





Floor diagram showing the location of the gravity mixer in the overall train of production operations. It is seen in the circle on the left side of this layout.

quired at cyclone dust discharge.

Mr. Henderson reports that ammoniation rates are calculated at a flat rate of 6 pounds for single super, and 4 pounds for triple super. "No tricks, such as overformulation or excess acid, are practiced, remarked Mr. Henderson. Free ammoniator rates of up to 6000 pounds per hour (for low nitrogen formulation) have been used without ammonia loss.

In production of low nitrogen grades, high moisture contents can be tolerated without serious loss of product quality. This is attributed to machinery lay-out characteristics, which allows production of a firmer, more rounded, closer-sized, product, containing a minimum of poor quality cracked oversize. The cracked oversize which does result, explained Mr. Henderson, has had some rough treatment and been through the cooler. The treatment also reduces sharp edges, breaks up weak particles, and conditions the stronger particles. Pulverized grades are screened to remove any crushed particles larger than 7-mesh. The amount of moisture that can be tolerated in any given formulation depends greatly on the nitrate content of the formulation.

Mr. Henderson indicated that semi-granular grades are made only on request. "We try to avoid high dryer temperatures by using a relatively high air to BTU factor, since high dryer temperature is a serious threat to granulation control."

In reply to questions from Round Table members, Mr. Henderson advised that in the production of 15-0-15 about 7½ units of solution are used, with no resulting nitrogen loss. Maximum temperature out of the drier is about 190°. The product is run dry in the ammoniator, and allowed to granulate in the drier. Retention time in the drier is about 15 minutes.

The Gravity Mixer

The gravity mixer was described by Walter Sackett, Sr., A. J. Sackett & Sons Co., who noted that the A. J. Sackett Gravity Mixer could be remotely controlled from a central panel board, saving the cost of a separate blender operator. In a series of diagrams, it was illustrated how the mixer handled two batches simultaneously, and how mixing action was accomplished.

Captions for illustrations below

Figure 1 shows the interior of the gravity mixer. The machine does a thorough mixing job of two or more solid ingredients without the use of any power; save the air required to operate the mixing gates. Its outside shell is essentially a vertical cylinder with square intake spout and transitional type hopper discharge. Its interior is divided into two chambers formed by two sets of semi-circular mixing gates. Located immediately above these gates are two vertically suspended rings or nests which create three compartments, the bottoms of which are formed by the mixing gates. These nests, in effect, divide each batch into three portions.

Figure 2 shows the position of both upper and lower mixing gates preparatory to receiving the first charge of ingredients to be mixed.

Figure 3 shows the ingredients as they enter and are accumulated in the upper chamber. While any number of ingredients may be compounded into the batch, it is very important to notice that the first third portion, as well as the second and third portions all come to rest directly on the mixing gates.

(*Continued on Page* 110)

Figure 1

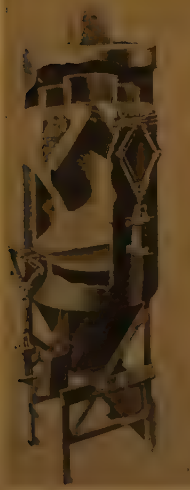


Figure 2

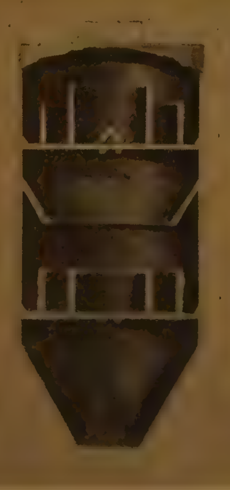


Figure 3

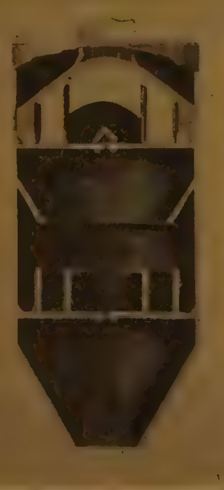


Figure 4

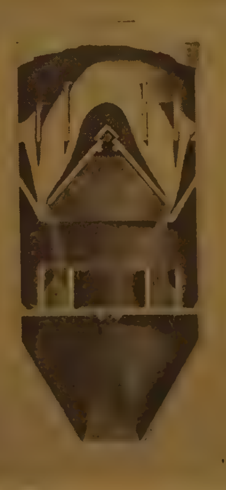


Figure 5

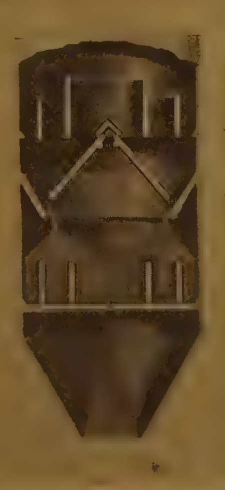
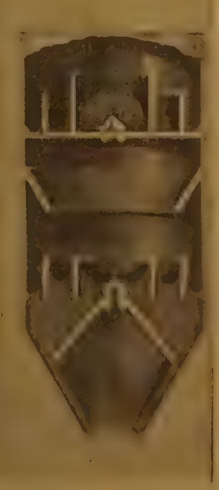


Figure 6



↓ *During the fertilizer season, advertisements like this in full color are appearing in Farm Journal, Farm & Ranch, Progressive Farmer, and Successful Farming.*

Keeps crops on the grow

it's the ammonium nitrate that's granular!

Corn, cotton, wheat, pastureland — whatever your crop, Hi-D® is the nitrogen fertilizer to use. You'll find it better than any ammonium nitrate you ever used before.

Hi-D always flows freely! Hi-D's special granules are unusually high in density and super dry, have much less tendency to pick up moisture prior to application. You will find it most satisfactory out in the field, even under humid conditions. Hi-D doesn't gum-up, won't clog, cake or bridge in your spreader.

Hi-D has a guaranteed analysis of 33.5% nitrogen. Half of this is nitrate nitrogen for vigorous early growth. The other half is ammonia nitrogen for sustained follow-up feeding. Your crops get the two types of nitrogen they do best on!

Let Hi-D keep your crops on the grow. It's sound management. But remember, first test your soil, lime if necessary and follow with the mixed fertilizer your dealer recommends. Then add the supplementary boost of Hi-D. Ask your dealer for it by name. Hi-D—best in the land!

COMMERCIAL SOLVENTS CORPORATION, AGRICULTURAL CHEMICALS DEPARTMENT, 260 MADISON AVENUE, NEW YORK 16, NEW YORK
OFFICES IN ATLANTA, CHICAGO, CINCINNATI, CLEVELAND, DETROIT, KANSAS CITY, NEW ORLEANS, ST. LOUIS, STERLINGTON, LA.

New Herbicides*

New foliage contact selectives: Karsil, Dicryl and Solan. Of these Karsil is promising in California, and may be marketed in 1960 for weed control in carrots and celery.

In translocated foliage selectives, 2,4-DB is the new material which shows a high selectivity toward a number of legumes even in seedling stage. The material should be handled like 2,4-D, although it is less hazardous because of high selectivity.

Dalapon is best of the translocated grass killers. It should be applied when there is sufficient foliage to absorb and translocate the chemical.

Amitrol — a translocated material with specific use, but with limited soil action.

by **W. A. Harvey**, extension weed control specialist, University of California

A discussion of new weedkillers presents something of a problem, since the decision as to what is new, depends on what is old or already known. Thus, I may be ahead of you and behind others in what I discuss as new. And just because we have one or several new herbicides doesn't mean we can forget the ones we were using last year. Some of them, older materials, with a background of experience and use, may offer a safer solution to a weed problem than a new herbicide which has had only limited trial.

It has long been my contention that we should know all we can find out about the chemicals we are selling or using as herbicides. What sort of things are they? How do they behave as chemicals? It isn't enough to know on just what crops or weeds they work, although this is important too. We need to know the why of the use, in so far as it is known. We need to know what the label says, plus the reasons. If a chemical is not used on a particular crop, we should know whether it's because the crop is sensitive, or because there is no residue information to permit it. Is the recommended timing of the application based on weed susceptibility, crop tolerance or residue analyses?

We could list hundreds of similar questions—and of course we don't know the answers to all of them. Since we can't test every chemical on every crop, and every weed on every soil under all possible climatic conditions of temperature, rainfall, irrigation, season, etc., it is most important that we know something of the behavior of the chemical itself,—so that we can predict its action under given conditions.

Not that we will always be correct in our predictions; we won't; we never have enough basic information to do it perfectly. But we can go a long way toward avoiding misuse if we consider the chemical itself—what is its solubility, volatility and toxicity? Does it break down readily in sunlight, or in the soil? If it is used selectively, what weeds does it kill, and what crop plants as well as weeds are tolerant? Is this selectivity related to the physical properties of the chemical, such as solubility, or is it inherent in the chemical itself or the plant, or both. Simazin, for example, is highly selective toward corn, in part at least because corn plants can break down Simazin in the roots. This is also true of the grapevine. Susceptible weeds do do not have this mechanism, and carry the Simazin into the leaves where it exerts its toxicity.

This is why we have tried to outline and group types of chemicals according to use. By so doing we can extend the limited knowledge we have and make some predictions of behavior of a new chemical based on our experience with an older chemical of a similar type or with a similar use. Let me review our outline briefly with you and we'll try to fit in the new chemicals as we go.

Our first breakdown is into selective herbicides and non-selective herbicides. Remember as we go along that we are making the division into groups on the basis of a specific use for these chemicals. Thus 2,4-D is a selective if used selectively in grain, but as a roadside spray it may be used to kill everything possible by using larger amounts per acre, by using some oil in the mixture, or by using an ester formulation.

The second breakdown into foliage applications and soil applications is based on the way the chemical enters the plant — either through the leaves or through the roots. And this difference is important in the way we handle the chemical to get effective results. If the chemical enters through the leaves, we must apply it in such a manner that it can contact the leaves and be absorbed. For root absorption, it is necessary to get the chemical into the soil—not just on the soil surface—and into the root zone of the plant we want to kill. This may mean only the sur-

---

*Presented at "New Pesticide Review for Central California" sponsored by Western Agricultural Chemicals Association at Fresno, California, September 10, 1959

I. SELECTIVE HERBICIDES

THESE are the chemicals used to remove certain weeds from certain crops. They are selective because of the way they are used. The selectivity is not absolute, and may depend on the amount of chemical applied, the way it is applied, the degree of wetting of the foliage, the amount of rainfall following, the tolerance of different plants to a specific chemical and differences in growth habit of crop and weed. Because selectivity can depend on all of these factors, the same chemical may be either selective or non-selective, depending on the use made of it.

A. Foliage Applications

These treatments are made to the leaves of growing plants, usually as sprays, but in a few cases as dust applications.

1. Contact

Chemicals in this group kill only the plants or portions of the plant actually contacted by the chemical. This means adequate distribution of the chemical over the foliage is essential. Selectivity may depend upon differential wetting, differences in form of plant, and upon placement of the spray.

- Dicryl (Niagara)
- Di-nitro selectives
- Karsil (Niagara)
- Endothal
- MAA (Sodar)
- PMA
- Potassium cyanate
- Selective weed oil (carrot oil)
- Sodium arsenite

2. Translocated

Chemicals in this group move within the plant, thus they may be effective in destroying roots of perennial plants, and low volume of application is often possible. Selectivity depends primarily on physiological differences among plants.

- 2,4,5-T
- 2,3,5-TP (Silvex)
- 2,4-DB
- MCPB
- Dalapon
- 2,4-D
- MCPA

B. Soil Applications

These treatments are made to the soil before emergence of the crop (pre-emergence) or after emergence of the crop (post-emergence). The weeds may or may not be up, depending on the chemical and the use made of it. Surface moisture must follow treatment for these herbicides to be effective; best results are obtained when these herbicides are carried into the soil by rainfall, overhead irrigation, or a subirrigation that thoroughly wets the treated area. Selectivity depends upon plant tolerance, location of herbicide in the soil, and difference in growth habit of crop and weed.

- CDAA
- CDEC
- CDT
- CIPC
- DCU
- Diuron
- Endothal
- EPTC
- Fenuron
- IPC
- Monuron
- NPA (Alanap)
- Natrin
- Neburon
- Sesin 2,4-DB
- Sesone (Crag No. 1)
- Simazin
- Sodium TCA
- 3T9

II. NON-SELECTIVE HERBICIDES

THESE are the chemicals used to remove a wide range of vegetation. Plants of course differ in their susceptibility to any specific chemical. We use these, however, where we do not intend selectivity.

A. Foliage Applications

These treatments are made to the leaves of growing plants usually as sprays but in a few cases as dust applications.

1. Contact

Chemicals in this group kill only the plants or portions of the plants actually contacted by the chemical. Success depends upon thorough coverage of all the vegetation with a solution or mixture containing sufficient toxic agent to kill all the vegetation covered. Annual weeds are usually killed by one thorough treatment. Perennial weeds require retreatment.

- Ammonium sulfamate
- Di-nitro general contacts
- Sodium arsenite
- Oils
  - emulsions
  - fortified oils
  - weed oils

2. Translocated

The relatively few chemicals in this group affect a wide range of plants but there is as yet no truly non-selective, translocated herbicide. Retreatment is usually necessary.

- Amitrol
- Dalapon
- Dalapon + 2,4-D
- Sodium arsenite
- 2,4-D
- 2,4,5-T

B. Soil Applications

A wide array of soil fumigants and soil sterilants fall into this group. They are used where it is desired to remove all plant growth or where it is desired to keep areas free of plant growth. Any plant roots in the treated area will be affected.

1. Soil Fumigants

These materials are most often used to kill all plant growth before planting to more desirable species. They usually function as a vapor or gas which diffuses through the soil, and they have a relatively short life in the soil. The treated area may be replanted within a month or less, with no toxicity remaining.

- Carbon disulfide
- Chloropicrin
- Cyanamid
- Methyl bromide
- Mylone
- Vapam

2. Soil Sterilants

These chemicals are used where it is desired to prevent all plant growth for periods varying from months to years. The length of time the soil will remain sterile will depend on the chemical used, the amount applied, rainfall, soil type, and composition.

- Chlorinated benzoic acid (2,3,6-TBA)
- Chlorinated phenylacetic acid (2,3,6-TPAA)
- Atrazine
- Borates
- Chlorates
- Diuron
- Erbon
- HCA
- Monuron
- Neburon
- Simazine
- Sodium arsenite
- Sodium TCA
- 2,4-D
- Urox
- White arsenic

Mixtures
- Borates + chlorates
- Borates + monuron
- Borates + 2,4-D
- Borates + chlorate + monuron

C. Aquatic Applications

A number of chemicals are used for control of submerged aquatic weeds by dissolving or emulsifying them in the water in canals, ditches, ponds, and lakes.

- Acrolein
- Aromatic solvents
- Sodium arsenite
- Chlorinated benzene
- Copper sulfate

Herbicide Classification Based on Specific Uses

face inch of soil if we want to kill germinative weed seeds, or it may mean a depth of several feet if we plan to kill deep rooted perennial weeds.

Foliage applications are further subdivided into contact and translocated materials, depending on the action of the chemical.

Reviewing some of the newer materials in these various groupings, the foliage contact selectives include such common things as dinitro selectives and carrot oils. The only new additions in this grouping at present are the Niagara selectives, Karsil, Dicryl and Solan. Only Karsil is showing promise in California. It may be marketed next year for weed control in carrots and celery, and would be directly competitive with the carrot oils. Since it is a foliage contact material, the use requirements are somewhat similar to those for dinitros and carrot oils. It should be used only on small weeds, since good coverage and wetting are necessary, and the volume must be sufficient to wet all the weeds. It will probably be used more like the dinitro selectives because it, too, is a concentrated toxicant, although the selectivities it exhibits are more like those of the carrot oils. Other desirable selectivities may develop from trials on other crops.

In the group of translocated foliage selectives, which includes 2,4-D MCPA, etc., the new material is 2,4-DB marketed by both Amchem and Chipman. This relative of 2,4-D shows high selectivity toward a number of legumes even in the seedling stage, and has been used in seedling alfalfa, peas, birdsfoot trefoil, alsike ladino and red clover grown for seed only. It has been used in established ladino clover seed fields for control of dock. Old established plants of dock are usually not killed with one spray, but the tops are killed back and regrowth delayed so that a ladino seed crop free of dock can be harvested. This material should be handled much like 2,4-D, although it is less hazardous because of its high selectivity. Registration for use on seed crops only is based on lack of residue information to permit use on feed and forage crops. Another caution that should be emphasized is to avoid mixing with 2,4-D. Even small amounts of 2,4-D in the mixture will result in the 2,4-DB acting like 2,4-D, with a resultant loss of selectivity. And control of small seedling weeds is better than control of larger weeds.

The selective, soil-applied chemicals differ from the foliage applications in that they must get into the soil if they are to produce satisfactory results. This has been a major problem in use of soil-applied chemicals in the arid West. Furrow irrigation is usually not an adequate substitute for rainfall in carrying them into the soil. Sprinkler irrigation is ideal, but only a limited acreage is thus irrigated. As a result, our research people are working with methods of incorporating these chemicals into the soil so they will be present when the weed seeds start to germinate.

Another disturbing factor in the use of sqil-applied selective herbicides is that the distribution in the soil depends on soil type and rainfall or irrigation in relation to the solubility of the chemical. Thus a more soluble chemical may work well with limited moisture on a heavy soil, but leach too deep on a sandy soil or with heavy irrigation. A less soluble chemical may show little activity on the heavy soil, but work well on a lighter soil or with more water. In summary, this means we must be cautious in our recommendations with these chemicals and go slowly, basing our use on knowledge of the chemical and experience with different soils and moisture conditions.

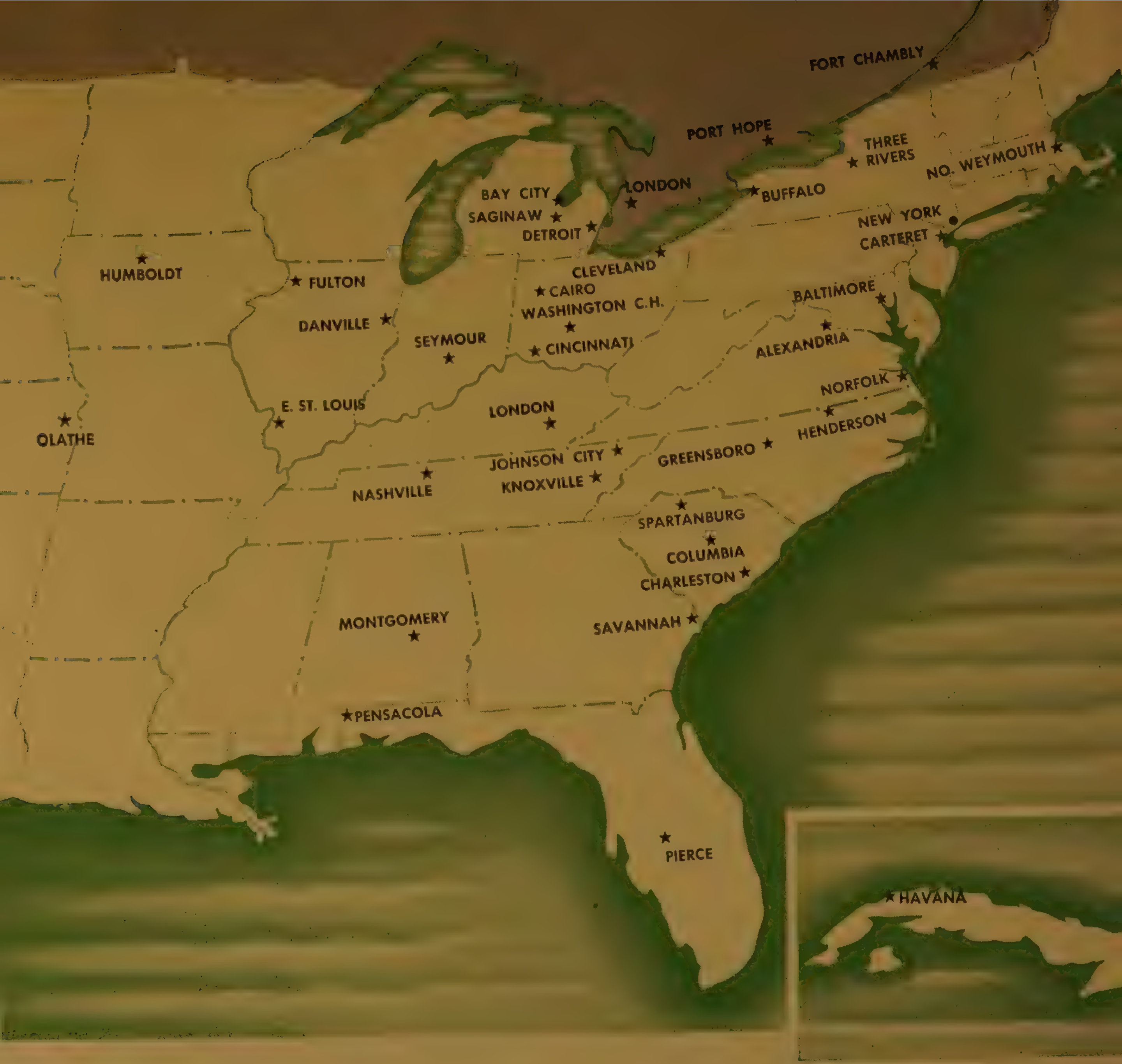
The three materials listed for discussion as new pesticides are Randox, Vegadex and Eptam. These are listed in the outline under the accepted common designations of CDAA, CDEC, and EPTC. The difficulties we have had in establishing satisfactory use of these materials goes back to the points discussed above. We cannot make broad general recommendations for any of them, because results will depend on soil type, moisture, and temperature. Results with all have been erratic. This doesn't mean they are not good and useful chemicals. It does mean that we need to know more about where and how they work, so we will have a reasonable assurance of success when we recommend them for a specific situation. This is true of all the materials in this group, and it is unfortunate that most of the materials are screened in the East under differing conditions of rainfall and higher humidity. In the West we must start all over again, screening them under our conditions of use.

The non-selective herbicides we again classify as such because of our use of them. It does not mean that they kill all vegetation, in fact most of them are specific as to what weeds they kill. We often use them for specific weeds, but in our use we are not trying to save a particular crop. These, too, we classify as foliage applications and soil applications for the same reason we separated them under the selective heading.

Under contact foilage applications there are no new compounds listed. Under translocated foliage sprays the listing includes amitrol which is the accepted common name for Amino triazole and Weedazol, and dalapon which is marketed as Dowpon and Radapon. Both of these chemicals are reasonably known now.

Dalapon is accepted as our best translocated grass killer. As such it needs to be applied in sufficient volume to wet the grass that is to be killed, and probably a wetting agent or a sticker-spreader is desirable to get optimum absorption by the grass. Where it is used as a non-selective for control of

(Continued on Page 106)



38 plants...for prompt delivery of AA quality products

38 plants of the A.A.C. Co., located in the United States, Cuba and Canada, with main office in New York, assure you dependable, fast deliveries of AA quality products for farm and industry. You can schedule your production with confidence . . . the right quantity and grade will be at your plant when you need it.

for uniform quality, prompt delivery and technical service . . . order from

The
**American
Agricultural
Chemical**
Company

producers of:

Florida Pebble Phosphate Rock • Superphosphate
AA® QUALITY Ground Phosphate Rock
All grades of Complete Fertilizers • Keystone® Gelati
Bone Products • Flousilicates • Ammonium Carbonat
Sulphuric Acid • Phosphoric Acid and Phosphates
Phosphorus and Compounds of Phosphorus

THE AMERICAN AGRICULTURAL CHEMICAL COMPANY
AA QUALITY

GENERAL OFFICE: 100 Church Street, New York 7, N.Y.

FERTILIZER WORKSHOP

Knowledge of customers, and knowledge of product, — cited as pertinent factors in increasing fertilizer sales at first Northeast Fertilizer Promotion Workshop.

"WITH farm prices declining in 1960 to a level estimated at 3% lower than in 1959, it is quite evident that salesmen in all lines will find the farmer a difficult customer this year", warned W. H. Garman, northeast regional director and chief agronomist of NPFI, in addressing the Northeast Fertilizer Promotion Workshop, held January 21 in Hershey, Pa. The workshop is part of NPFI's program (now in its third year) to expand the fertilizer market. Mr. Garman continued his comments on the fertilizer market for 1960, observing that "of all the salesmen calling on the farmer, the one representing fertilizers will have the best story to tell. Each unit of farm output today will buy 2.6 times more plant food than in 1959. Representatives of no other commodity can make such a statement.

"Without fertilizer in the farming formula in 1960, and the years immediately ahead, farmers will be unable to pay for their other basic production needs, let alone avail themselves of some of the luxuries of life.

"With adequate fertilizer in the farming formula in 1960", concluded Mr. Garman, "and the year ahead, farmers will uncover hidden payrolls in more and more communities and counties throughout the entire Northeast".

"A change in selling methods is needed, if the industry is to grow and prosper", stated Ralph Everett, Empire Sales Training Center, in commenting on selling fertilizer. "Sell a plan of fertilization which will fulfill the mental concept every farmer dreams about", he urged.

Russell Coleman, executive vice president of NPFI, explained to salesmen and industry representatives attending the workshop, that the meeting was designed to present information about those factors that are common to most good salesmen, — particularly as these points are related to selling fertilizer. The pertinent factors, he said, are: (1) knowledge of customers, and (2) knowledge of product. "We have some information for you good salesmen, much of which may serve as ammunition for you in your day-to-day selling operation. We will be talking about selling fertilizer to the customer, — that is the farmer."

NPFI's chief agricultural economist, Moyle S. Williams, presented various data showing what farmers can do in the way of yields in Pennsylvania by applying correct fertilizer practices. This data included cost and return figures on crops, yield possibilities, increase in milk production possible with adequate fertilization and other recommended practices, and data showing profits per acre. Typical of the data shown, is the following table showing costs and returns

(Continued on Page 104)

Costs and Returns from Crops
(Per Acre Annual Average for 3-Year Rotation of C-W-H)

	Present Low Fertilization		Possible Fertilization Recommended		Due to Fertilizer & Good Practices
Value of Crop		$55		$121	$66
Costs:					
Fixed (Overhead)	$31		$31		
Annual (Operating)	10		24		
Total		41		55	14
Net Returns		$14		$66	$52

On right: W. H. Garman, Northeast Director, NPFI; A. C. McCall, Davison Chemical Division, W. R. Grace & Co. and H. J. Stangel, Allied Chemical.

Bottom left: V. A. Ericson, Consolidated Rendering Co., Boston and W. R. Alstetter, NPFI.

Bottom right: A. H. Hanssen, Davison Chemical Division, and Merle Adams, NPFI.

1960 Seen as Important Year for Use of Chemicals on Cotton . . . report at

BELTWIDE COTTON

"INDICATIONS are that 1960 will be a really important year for the use of chemicals as weed control agents for cotton," observed Dr. Walter K. Porter, Jr., Louisiana State University, in addressing the Beltwide Cotton-Mechanization Conference held January 14-15th in the Peabody Hotel, Memphis, Tenn. Several other speakers participating in the program confirmed the increasing importance of chemicals for seed treatment, harvest aids, disease control, growth control, etc. From a practical standpoint, Dr. C. W. Kearns, entomologist at the University of Illinois, Urbana, warned that continued use of chemicals is bound to bring with it the problem of resistance. He pointed out that resistance is evolutionary in nature, that it will recur endlessly, as long as highly suppressive measures are continued,—yet he recognized that such measures are essential to high production and quality products.

"I think that chemicals will continue in years to come to be the major weapon for the control of cotton insects, in spite of the fact that resistance problems have become severe in some areas," said Dr. Kearns. He feels present compounds and development of new ones will give the time needed to "reorient our thinking and organize our research along the lines indicated by the formidable nature of the problem."

"1960 is the year in which the greatest push will be made toward use of herbicides for the reduction of hand labor, reduction of weed-cotton competition, reduction of mechanical efforts, and reduction of weed contamination in the harvested production," stated Dr. Porter. At present, pre-emergence practices are recommended to some degree in all cotton-producing states except in the far west. In 1960, herbicidal oils will be the only post-emergence early season chemical practice recommended. Flame cultivation will be generally recommended for mid- or late-season control in Arizona, Arkansas, California, Louisiana, and Mississippi.

For several years, residual type herbicides have been used in irrigated areas to keep fields free of weeds after mechanical lay-by. Monuron and diuron are recommended in these western states. Dr. Porter said it appears some mid-South states will suggest preliminary use of diuron as a lay-by agent for 1960.

Dr. Wayne C. Hall, Texas A & M College, College Station, Texas, said that use of chemicals as an aid in harvesting cotton has shown a striking growth during 1952-58, despite steadily declining acreages. Harvest-aid chemicals moved from 10 per cent of the cotton acreage in 1952 to 18 per cent in 1955, and jumped to 40 per cent in 1958. Another significant feature, reported Dr. Hall, is the general decrease in use of dust defoliants and increase in spray defoliants and desiccants. Use of dusts has declined in the far West and use of desiccants has increased in the Southwest.

"Aerial application still dominates, with approximately 64 per cent of the treated acreage being done by air in 1958," stated the speaker. "It is doubted these figures indicate an advantage of aerial application over ground machines in effectiveness," continued Dr. Hall. "It is more a matter of economics and convenience."

1959 Cotton Crop Reduced 13½ Per Cent by Disease

Diseases took a bite of over two and a quarter million bales out of the 1959 cotton crop, according to the Cotton Disease Council. This loss represented almost 13½ per cent of the total yield. Figures were compiled from estimates of 56 state cooperators reporting state and federal research and extension workers and private industry groups.

Balewise, Texas, was top loser, with almost 900,000 bales taken by disease. Mississippi was second with 223,360 bales, and California was next with a 221,423-bale loss. Biggest loser in yield percentage-wise was Missouri with 22 per cent, followed by South Carolina at 20 per cent.

Bacterial blight was the most damaging disease, causing a loss of over 400,000 bales—almost 2½ per cent of the entire crop. Seedling diseases were close, resulting in a loss of nearly 350,000 bales, while boll rots claimed 380,000 bales. The report emphasized the need for continued and increased cotton disease research and extension.

In reply to the question, "Why are state recommendations often different from manufacturers' recommendations?" Dr. C. D. Ranney, plant pathologist, USDA, observed that "In each state research workers have determined optimum materials and rates for their location and environmental conditions. Variations in recommendations point out the necessity of checking local state recommendations."

"While there is little doubt of the value of seed treatment, it, like an insurance policy, has limitations. Only a very small area in the soil around the seed is permeated by the chemical," he stated.

MECHANIZATION CONFERENCE

Chemicals will continue to be prominent in control of cotton insects, in spite of resistance problems which have become severe in some areas.

Variations in recommendations in different states are due primarily to environmental conditions. State research workers determine optimum materials for local areas.

"Therefore, the cottonseed is protected from soil-borne organisms only within this zone. Under cold, wet conditions young plants completely lose their ability to resist a number of these organisms."

Dr. Ranney emphasized the importance of contacting state experiment stations and extension services for specific information on local recommendations.

A New Cotton Plant Hormone

In a further discussion of chemicals for cotton, — Dr. V. T. Walhood, U.S. Cotton Field Station, Shafter, Calif., and Dr. H. R. Carms, USDA, Los Angeles, reported to the Cotton Conference on hormones as a major factor in whether a cotton plant holds or sheds its bolls. The physiologists said that study of plant hormones in young cotton bolls has demonstrated that at least three different growth promoting substances and one retarding substance occur naturally. The amount of these substances varies with boll age and variety. They reported that a positive correlation has been found between the activity of the hormone retarding growth and boll drop. Work shows it speeds boll drop under a variety of conditions.

"Although the new hormone has not yet been obtained in pure form, applications of partially purified samples to young bolls speeded up the amount and rate of boll drop," the researchers said. They also indicated that work on the role of gibberellins is continuing.

Expanded Weevil Res. Program

Details of the most "intensive research program ever activated to deal with an insect problem" were outlined by Dr. E. F. Knipling, director of the Entomology Research Division, Agricultural Research Service, Beltsville, Md. It is expected, Dr. Knipling said, that contracts will be let by May, 1960, for construction of a $1.1 million boll weevil research laboratory at Mississippi State University. By current estimates, the laboratory will be ready for occupancy by June 1, 1961.

Dr. Knipling said it is hoped that some of the facilities will be available to start research several months prior to this date. The exact timetable can't be projected since operating funds have not been appropriated. If funds are provided, major areas of work at the laboratory will include research on insect control chemicals, varieties of cotton resistant to boll weevil attack, biological control, and basic and supporting investigations.

Dr. Knipling said there is an immense urgency to strengthen chemical research to develop new, effective, and safe insecticides, pointing out the continuing threat of resistant insect strains justifies the high priority. Research to develop resistant cotton varieties has been judged one of the most neglected areas.

The speaker said a committee of scientists active in cotton insect research will be established to help guide the program. "Every effort will be made to cooperate closely, not only with the State of Mississippi but with other states engaged in cotton insect research." He emphasized the need for strengthening research at other state and federal laboratories to round out a more effective program.

First objective of the program, according to Dr. Knipling, will be to reduce the $300 million annual loss caused by the boll weevil. Ultimate aim will be to develop and demonstrate feasible ways of eliminating the boll weevil.

Improved Pesticide Application

JUST as chemical companies work to develop new and better pesticides, industry and public research organizations are studying improved methods of application, Lambert H. Wilkes of the Texas Experiment Station, reported. Agricultural engineer Wilkes described some of the studies now under way in this field. Better methods of application are needed, according to Mr. Wilkes, because even with as many as 15 to 20 insecticidal applications in a growing season, cotton farmers are still losing millions of bales each year to insects.

Describing investigations now in progress, Mr. Wilkes said studies in Texas have resulted in recommendations of simple nozzle arrangements and low gallonage rates to Texas farmers.

"Studies showed that equally effective control of insects can be obtained by timely applications with two gallons of total spray as compared with 14 gallons per acre, provided the same amount of ac-

(Continued on Page 117)

"It wasn't there last year!"

This is the new 300,000 sq. ft. addition to Kraft Bag Corporation's converting plant at St. Marys, Georgia, scheduled to go "on stream" in February.

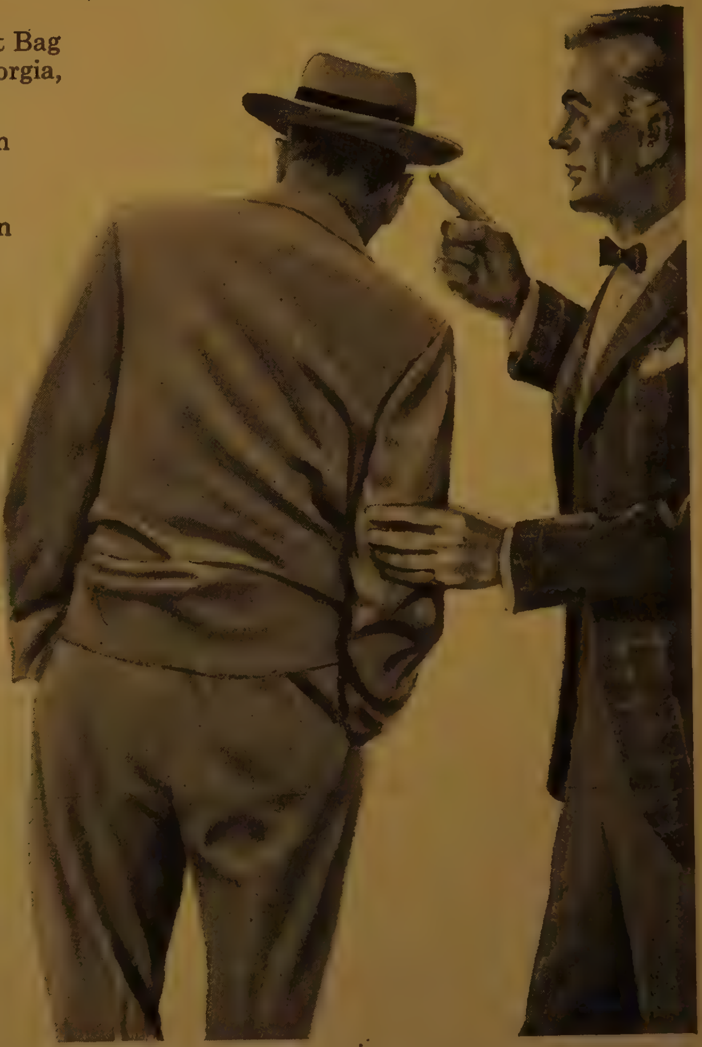
Here, in one giant integrated operation, logs from our own forest lands are turned into pulp, then into paper, and finally into heavy duty multiwall shipping sacks, using the most modern machinery and equipment the industry affords.

This expansion of our facilities is one more step in our constant efforts to provide our customers with the best in quality and service.

We invite your inquiries.

Paper Mill at St. Marys, Ga.

KRAFT BAG CORPORATION
Gilman Paper Company Subsidiary
630 Fifth Avenue, New York 20, N. Y.
Daily News Building, Chicago 6, Ill.



SILIKIL

a new concept of insect control

A report offered by United Heckathorn Co., Richmond, Calif.

AMORPHOUS silicas have recently been found to be excellent insecticides. The mode of action is primarily physical. These sorptive dusts adsorb the wax cuticle coating of the insect, thus causing the loss of its body moisture and consequently causing death by dehydration. The insect has to lose at least 30% of its body moisture before mortality takes place.

United-Heckathorn, at their Garfield, Utah, plant, where they manufacture cryolite and other fluorides, have developed a pure white micro-fine amorphous silica trademarked "Silikil". Chemically, Silikil is silicon dioxide (the same chemical constituent as sand).

Properties of Silikil

Silikil has many outstanding properties as an insecticide: (1) *Immediate Kill*—Kill is relatively quick, varying from 30 minutes on ants to 2 hours on roaches. (2) *Residual Control*—The most outstanding feature of Silikil is its prolonged residual kill. There is no loss of residual control through chemical decomposition. One to several months' control on most insects is not uncommon, and in the case of drywood termites, protection for several years is apparent. (3) *Non-Injurious* — Non-injurious when used as directed, silicas have been used for many years for talcum dusting powders and paint flattening agents. Amorphous silicas, being non-crystalline in nature, present no hazard from silicosis. (4) *Resistant Proof* — The action of Silikil being physical, it is believed insects will not become resistant to these types of products.

Silikil can be used as a dust or as a spray. Moreover, when Silikil becomes wet from rain or dew (when the material is dry again), it does not lose its insecticidal effectiveness. Silikil also gives a more rapid kill under high humidity conditions. Silikil has good adhesion qualities to wood, glass, painted or plant surfaces, giving a heavy uniform deposit. This is due to a strong positive charge or polarity present on the dust from the small percentage of fluorides present. The fluorides, once the insect is dewaxed, are also able to act as contact insecticides on insect tissues, hastening kill time.

Silikil is also non-phytotoxic—it has been tested on a great variety of greenhouse and agricultural plants without causing any plant injury. Some injury on roses has occurred in greenhouses under heavy dew conditions.

Registration

SILIKIL is presently registered with the United States Department of Agriculture for the control of drywood termites, cockroaches and fleas. State registration on Silikil products has been obtained for the control of termites, cockroaches, bedbugs, silverfish, ants, earwigs and household spiders; the elimination of bees and wasps in structures; control of fruit flies in packing plants; control of fleas and ticks on pets; control of houseflies and mosquitoes; and for the control of stored product insects, such as Mediterranean Meal Moth and granary weevils. Registration is pending for the control of red spider-mites and thrips on greenhouse plants and as a spray for the control of red scale on citrus trees.

The control of poultry lice and mites as well as livestock ticks, flies and lice looks very promising with Silikil sprays or dusts.

Promising results have also been obtained on lygus and other plant bugs on field crops, mites and thrips on fruit and field crops, and for the control of grasshoppers and crickets. The control of mites is somewhat selective as Silikil controls two-spotted mite and not brown almond mite. Control of soft-bodied sucking insects, such as aphids, bollworms, corn earworms, mealy bugs and cabbage loopers, has been relatively poor. This is thought to be the result of these insects being able to rapidly replenish their body moisture.

Since fluorine is the only chemical toxicant present in Silikil, the Federal tolerance for edible crop usage will fall under the 7 ppm fluorine tolerance. At recommended dosages, the fluorine present at the time of application will not exceed the tolerance.

Silikil Products

Silikil is manufactured in several grades for specific uses. "Silikil Light" is a micron fine-silica gel weighing 4 pounds per cubic foot that is used primarily to dust attics to prevent entrance of drywood termites. "Silikil Regular," weighing 12 pounds per cubic foot, is used for termite prevention and is more suitable for common household insects, where a heavier dust will stay put where laid. "Silikil Heavy," weighing 22 pounds per cubic foot, has the same weight as commonly used insecticide dusts. This product can be applied by conventional aircraft or ground dusters. Silikil Heavy has been developed pri-

(*Continued on Page* 105)

E. Rahn Succeeds L. Utter as President of Northeastern Weed Control Conference

L. G. Utter, Diamond Alkali Company, Painesville, Ohio, outgoing president of the Northeastern Weed Control Conference congratulates E. M. Rahn, Univ. of Delaware, his successor for 1960.

SOME 15 new herbicides approched another plateau toward the goal of commercial acceptance, as test results indicating their effectiveness were reported at the 14th annual meeting of the Northeastern Weed Control Conference held January 6-8, 1960 at the Hotel New Yorker, New York City. Among the new materials reviewed were: Solan and Karsil (Niagara Chemical); Carbyne (Spencer); Zytron (Dow); Falone and NPA (Naugatuck Chemical); DAC-893 or Dacthol (Diamond); and Lilly 13489 (Eli Lilly).

Commenting on some of these promising new herbicides, M. W. Meadows, GLF, reported that Karsil has shown promise on such crops as celery, carrots, parsley, strawberries and sweet potatoes, with effective rates at about 4 pounds per acre; Solan used as a post emergence spray has been effective in controlling annual broadleaf weeds in tomatoes, carrots, celery and strawberries—effective at 4 lbs/acre; Atrazine at 1 to 2 lbs/acre has given excellent control of annual weeds and annual grasses, when applied pre- or early post emergence to corn; Zytron is promising for pre-emergence in carrots, — and offers good control of crab grass in turf, rates of 10-15 lbs/acre.

Boyce Thompson researchers, P. Schuldt, L. Limpel and D. Lamont report that DAC-893 merits considerable field evaluation. This chemical, they say, provides one of the best compromises between crop tolerance and control of weeds because of its activity against many annual weeds without injury to numerous horticultural and agronomic crops.

Mark Wiltse, Dow Chemical Co., pointed out that Zytron is a safe herbicide, with a very low toxicity. The LD_{50} for dogs and cats is greater than 1.0 gram/kg, and thus the product has a moderate to low acute oral mammalian toxicity. Physiologically its activity is as a root toxicant to germinating seedlings, and as a selective foliar contact herbicide, where used as a post emergence spray.

Weed Control in Tomatoes

The control of weeds, particularly purslane, redroot pigweed, lambs quarters, crabgrass and barnyard grass has constituted one of the major production problems with tomatoes from the standpoint of competition for water and nutrients, disease and insect control, and injury from slugs. O. Schubert and N. C. Hardin, West Virginia University, reported on an evaluation of several herbicides to determine relative effectiveness and extent of tomato plant injury. "Amoben was considered to be the most satisfactory from the standpoint of general weed control and effect on tomato plants for seven weeks. For longer periods repeat applications might be desirable, or another herbicide considered". They indicated Solan is acceptable for control of broad-leaved weeds, but proved not to be satisfactory for control of grasses. Under the conditions of the trial (with a medium sandy loam and irrigation) all forms of Simazine were too phytotoxic at the 2 lb./acre rate. Simazine 4G did not give uniform weed control, and caused erratic plant injury.

Charles Moran, Campbell Soup Co., reported on broadcast treatments, using Amoben, CIPC, EPTC and Solan,—and advised that granular formulations of Amoben at 4 pounds, EPTC at 4 pounds (worked in) and CIPC at 12 pounds, when applied to weed-free tomatoes at lay-by, approached the point of commercial acceptance for late season weed control. EPTC, he said, when not mixed with the soil, was ineffective in 1959. Solan as an aqueous spray at the 4 pound rate was not effective in controlling emerging weeds.

Niagara Chemical researchers D. H. Moore and K. P. Dorschner reported that Solan at 2, 4, or 6 pounds per acre gives excellent control of pigweed, lambsquarters, and other broadleaf weeds. Control of annual grasses, "though good, is no quite as impressive."

Simazine & Atrazine Most Promising for Corn

Sweet corn has been weeded on a commercial basis with chemical herbicides for many years. The common chemicals used are 2,4-D or a water soluble dinitro. Weeding with these chemicals is not always satisfactory, since some weeds are not killed, and sometimes the corn is injured by the treatment. C. J. Noll, Pennsylvania State University, reported that several new chemicals tried in 1959 look promising for the weeding of a corn crop. Showing most satisfactory results, he said, are: Simazine, both as a spray and as a granular in a pre-emergence treatment; Atrazine in both a pre- and post-emergence treatment; Trietazine, Vegadex and Randox in a pre-emergence treatment; and Niagara 4556 in a post-emergence treatment.

M. F. Trevett and W. E. Gardner, University of Maine, reported that in a test of granular herbicides for sweet corn, Atrazine gave better control of both mustards and northern nutgrass than did Amoben-M-728, Dalapon, Simazine, EPTC, Trietazine, CDEC, CDAA, Falone, or DNBP.

In pre-emergence treatments of sweet corn reported by Frank B. Springer, Jr., University of Delaware, excellent control of broadleaves and grasses was obtained with Atrazine at 2 and 4 pounds per acre. Simazine was satisfactory at 2 pounds per acre on broadleaf weeds, but not as effective on grasses. At 4 pounds per acre, Simazine gave good control of broadleaves, but very poor control of grasses. "Atrazine appears to be much more effective on both broadleaf weeds and grasses than Simazine when moisture is limited", concluded Mr. Springer.

A progress report with herbicides applied for quackgrass control in field corn, presented by Jonas Vengris, Univ. of Massachusetts, concludes that Eptam is effective in controlling quackgrass. A rate of about 5-6 pounds/acre of Eptam is suggested. Simazine and Atrazine are also promising for controlling quackgrass, he said, — suggested rate is 6 pounds/acre.

Highlights

- **Amoben found most satisfactory for general weed control on tomatoes.**
- **For sweet corn, Simazine and Atrazine are most promising of the new chemicals.**
- **Good weed control on soybeans is obtained with NPA, CDAA and Emid. Other herbicides performing well are Amoben, Dacthol and Zytron.**
- **Ammonium methyl arsonate with 2,4,5-TP and with 2,4-D, has consistently given the best control of chickweed in turfgrass.**

"The increasing demand for clean soybeans at time of harvest provides the necessary impetus for testing new herbicides in soybeans", remarked J. A. Meade and P. W. Santelmann, Maryland Agricultural Experiment Station. "Along with the search for new ones, the old ones must be evaluated under a different set of environmental conditions." They indicated that in pre-emergence experiments, NPA at 4 lbs/acre, CDAA at 4 lbs/acre, and Emid at ¾ lbs. and 1½ lbs/acre showed good weed control and resulted in yield increases over the checks. Three new herbicides also performed well, they reported: Amoben at 2 and 4 lbs/acre, DAC-893 at 4 lbs/acre, and Zytron at 12 lbs/acre, all resulted in good weed control.

A team of AmChem Products investigators commented on results of an experiment to compare the response of soybeans grown in Goagland's solution to the different substituted benzoic acids. Under conditions of the tests, soybeans showed the greatest tolerance to 3-nitro 2,5-dichlorobenzoic acid. Strong formative effects appeared at concentrations of 10 ppm and above.

Stauffer 2061 for Red Beets

Although table beets are of relatively minor importance in terms of total acreage and value, — they are an intensive high value per acre crop. Weed removal constitutes one of the major production expenses. R. D. Sweet, Cornell University, reviewed research by many workers in past years, and emphasized that there is a pressing need for a better herbicide. 1959 field tests, he said, indicate that Compound 2061 (propyl-ethyl-n-butylthiolcarbamate) warrants further intensive study for selective use in red beets. One of the more promising compounds tested, CDEC, was found to be extremely toxic to red beets in 1959 in New York State. Research data, he explained, tends to show that much higher than normal temperature rather than formulation, poor application or other factors was the cause of the damage. Stauffer's

Dr. William F. Meggitt (center), Rutgers University, receives a certificate of merit from S. N. Fertig, Cornell University, for his outstanding paper entitled "The Influence of Cultivation on Corn Yields When Weeds are Controlled by Herbicides." Stewart K. Wright, was presented the County Agent Award.

In many ways

a farm indispensable...

that's why sales-minded dealers formulate with...

Triangle Brand Copper Sulfate is used

- *in fertilizers as a soil enricher*
- *in feeds as a dietary supplement*
- *in fungicides because it's compatible*

For information on formulating Triangle Brand Copper Sulfate into your farm products, write

Phelps Dodge Refining Corporation

300 PARK AVENUE, NEW YORK 22, N. Y.

2061 proved to be as effective against weeds, but much less toxic to red beets than the related EPTC.

CMPP, 2,4-D, MCPA Effective on Oats

The chemicals most effective in controlling weeds in oats were: CMPP, 2,4-D amine and MCPA. The ester formulations of 4 (2,4-DB) were more effective than the amine formulations, with the 4 (2,4-DB) formulations being more effective that 4 (MCPB), according to S. N. Fertig, Cornell University. He further reported that the highest yields of oats were obtained from the CMPP, 4 (MCPB), 2,4-D amine and MCPA treatments. The yields increased with rate of chemical used for both CMPP and 4 (MCPB). With the ester and amine formulations of 4 (2,4-DB) yields decreased with increasing rate of chemical.

From these and other experiments, the evaluation of legume stands after the removal of the small grain, or late in the fall, is not a good criterion on which to base forage yields the following year. The combination of competition from small grain and the herbicide is far more serious than either condition alone. Also the competition from the small grain is more severe than the rate of herbicide treatment necessary for weed control.

Herbicides for Berries and Grapes

Of a number of herbicides tested on strawberries during 1957 and 1958, Neburon granular at 4 lbs/acre active and Eptam granular at 5 lbs/acre active were outstanding with regard to degree and duration of weed control and lack of crop injury. E. M. Rahn and D. J. Fieldhouse, Univ. of Delaware, indicated that even higher plant population resulted with the same treatments in 1959 due to lack of weed competition.

J. S. Bailey, Univ. of Massachusetts, reported on weed control in cultivated blueberries with diuron, advising that the use of diuron in excess of 2 lbs/active may result in injury to some varieties. Repeated use of diuron at 3 pounds or more per acre may result in cumulative toxicity.

M. F. Trevett, Univ. of Maine, indicated that to reduce herbicide injury to lowbush blueberries, carriers more viscous than either water or #2 fuel oil are needed to limit drip and spatter of solutions during application. If phytotoxic oils (SAE #40 motor oil) are used as carriers, stem coverage is essential to insure satisfactory control.

New York State investigators, reporting on bindweed control in Concord grapes, indicated that although 2,4-D showed promise as a control, the drift and volatility hazards are too great to allow use of this material by the method of application employed. Dia, on the other hand, applied during three consecutive years at rates of 1 and 2 lbs/acre gave excellent control of bindweed, without affecting yields or soluble solids of grapes.

Quackgrass and Crabgrass Control

Traditionally, quackgrass has been one of the more difficult weeds to eradicate or control. In spite of the many control measures used in the past, the costs and losses to agriculture and industry due to this pest have increased. S. N. Fertig and H. M. LeBaron, Cornell University, discussed studies underway of new and old materials to control this pest. "The development of organic herbicides effective for quackgrass control has been slow", they observed, "They have generally been too costly and with too little selectivity for wide use. However, in recent years, several new chemicals possessing considerable selectivity have been developed which are effective against quackgrass".

Dalapon treatments resulted in considerable decrease in fructose, although when no further treatment was applied or even with plowing, some rhizomes survived in apparently healthy condition.

Tests have indicated that nitrogen applications followed by application of dalapon gave significantly better control and depletion of rhizome reserves than dalapon alone. The interaction between dalapon treatment and fallow also seem to be important.

J. M. Duich, Pennsylvania State Univ., reporting on pre-emergence crabgrass tests, advised that Zytron and calcium arsenate gave very satisfactory pre-emergence control of crabgrass from single spring applications without injury to common Kentucky bluegrass. Pax and calcium arsenate treatments resulted in better than 75% control, but this was not satisfactory on the basis of plant survival per square foot.

" A number of pre-emergence herbicides tested gave good control of crabgrass", reported R. G. Mower and J. F. Cornman, Cornell University, Among the arsenicals, calcium arsenate gave excellent crabgrass control (90%) with no turf injury. Lead arsenate and the arsenical-fertilizer proprietary formulations were less effective and treatments with the latter were injurious to the turf. Chlordane formulations ranked third in effectiveness. Of the experimental products, Zytron appeared to be the most promising. Nearly complete control was attained with no evidence of turf injury. DAC-893 gave equally good crabgrass control, but caused serious injury to red fescue. Fenac and the Lilly compound were less effective.

One of the most serious pests in turfgrass areas is chickweed, agreed P. M. Giordano and J. A. DeFrance, Rhode Island Agricultural Experiment Station, who described tests with several materials to control this weed. ML-254, ML-342 and ML-343 (ammonium methyl arsonate with 2,4,5-TP, 2,4,-D) gave the most consistent and best control, they said, with only slight discoloration of the turf. Bonus, a fertilizer-herbicide formulation provided reasonably good control; 4-XD (2,4,-D impregnated on vermiculite) gave inconsistent

(*Continued on Page* 109)

WASHINGTON REPORT

By Donald Lerch

DESPITE warnings from the House, a running feud is still going on between Health, Education and Welfare and U. S. Department of Agriculture over chemicals-in-foods. Each new charge by HEW Secretary Arthur S. Flemming that a food is "tainted" by a chemical is interpreted here as an implied attack against USDA.

It was against this background that Agriculture Secretary Ezra Taft Benson issued his outspoken statement on chemicals-in-foods. With the knowledge that Secretary Flemming's attacks are jeopardizing U. S. food exports, Secretary Benson declared that "our food supply in the United States is the safest, cleanest, and most wholesome in the world."

Secretary Benson went on to point out that chemicals are essential to food production, that USDA assists growers, processors and distributors to market foods that meet all requirements of law regarding safety, and that wide public understanding of these facts is needed if we are to continue to produce good foods, economically and safely.

Behind Secretary Benson's comments on meeting "all the requirements of law" is the conclusion of many people here that Secretary Flemming has overreached his authority under the law in his attacks against minute residues of some specific pesticides on crops. Pesticides were specifically exempted from the Food Additive Amendment which Secretary Flemming used to justify his attack on cranberries.

While the HEW-USDA battle gets hotter, a real blowup is developing from experiments at the University of Puerto Rico's School of Medicine. Dr. Josel Szepsenwol there reports that chicken eggs cause cancer in mice. The specter of cancer caused by a "natural" food pulls the rug from under the so-called Delaney clause in the Food Additive Amendment. This prohibits the addition to foods of any substance that has been shown to produce cancer in laboratory animals when fed at any dosage.

It has long been the view of many scientists that materials which can cause harm in massive doses — such as salt — may cause no harm or even be beneficial in small amounts. Similarly, chemicals, highly toxic in sizable amounts, may be completely harmless in trivial amounts.

If Dr. Szepsenwol's research stands up, and if other similar research results are turned up, you can expect some strong efforts to bring legislation and the administration of it back into line with scientific realities. Chances are that you will hear a lot more about "trivial" amounts in relation to residues in or on food crops in the coming months.

* * * * *

The future looks bright for formation of a Pesticides and Wildlife Relationships Committee by the National Academy of Sciences. The new committee will be set up along the lines of NAS's Food Protection Committee. Top scientists in toxicology, forestry, entomology, agronomy, chemistry, agricultural economics and ecology on the committee would review all research data. Then they would suggest research to close the gaps in our knowledge about pesticide-wildlife relationships.

Support for this program came from nearly everyone at a meeting of industry, wildlife and government leaders held without fanfare at the National Academy of Sciences here last month. But many questions were raised as to what the committee really would accomplish. Here are some of the views expressed:

Pesticide Industry spokesmen: The first job is to determine whether or not the problem is real or imaginary. If it's real, then let's decide what to do about it. We may find other factors — highways, urbanization, and not pesticides — are the real problems we must deal with to protect our wildlife populations.

Wildlife spokesmen: There's a problem, all right. You can expect a strong reaction from wildlife enthusiasts every time there is a kill of birds, fish, or animal wildlife caused by pesticides or which the wildlife enthusiasts *believe* is caused by pesticides. This will increase as pesticide use increases, as we believe it will. We must have much more information and possibly some change in materials and application methods before wildlife enthusiasts can be assured that pesticides are not a major threat to wildlife.

Government spokesmen: Scientists are doing a successful job of advancing agriculture through pest control and with no evidence of decline in wildlife populations. The public problem comes from a lack of information rather than from positive information that pesticides are a hazard. We encourage cooperation of wildlife biologists, but cooperation has been limited by lack of qualified scientists on both sides. Closer cooperation and a frank exchange of *factual* information is essential if we are to get any improvement in the current situation. Extensive research has demonstrated there is no hazard to humans from the proper use of pesticides today.

Here are two other significant views:

NAS spokesmen: As science advances, as population grows, we get into many new, apparent conflicts. An NAS committee of scientists can help to resolve these apparent conflicts on a scientific level. A Pesticides and Wildlife Relationships Committee cannot be expected to solve the problem of public emotionalism over the issue, but it can provide the basic, factual information. It's up to participating groups to carry that information to the public.

Individual spokesmen: Some pesticides-wildlife conflicts are not just apparent. They are real. As an example, spraying elm trees with a low-cost insecticide to control Dutch elm disease can and sometimes does result in some kill of birds. Spraying with a more costly material causes no bird kill. The decision to 1) save the trees, 2) if so, to use the cheaper material and expect some bird kill, or 3) to use the more expensive material with no kill of birds are questions of public policy, not of scientific fact. We need value judgments on what provides the most good for the largest numbers of people. Few scientists, trained to seek knowledge and report research results in their own often narrow fields, are mentally or emotionally qualified to resolve such problems. They must be decided by the public and by political bodies representing the public interest.

How can these views be summed up? Most leaders involved in the issue say the first step is to gain an exchange of factual information and build cooperation and understanding among wildlife biologists, ecologists, entomologists and others on the scientific level. Formation of an NAS Pesticides and Wildlife Relationships Committee, many people feel, can do this job. The Committee can also advise government officials on public policy.

Some leaders are firmly convinced, however, that the Pesticide Industry and those who use pesticides for forest pest control, highway roadside maintenance, community health or comfort, or agriculture must clarify the real issues for the public, and seek public decisions in favor of the proposed pesticide uses where public judgment rather than mere questions of fact are involved.

Those who argue for this point of view also are convinced that the benefits of using pesticides properly are so great and the real drawbacks are so few that the public decisions will greatly expand both the use of pesticides and the public's understanding of them.

* * * * *

President Eisenhower and the Budget Bureau apparently do not see eye to eye with those seeking to increase spending on wildlife-pesticide research. Although Congress last year approved appropriation up to $2.5 million a year to be spent by U. S. Fish and Wildlife Service for this research, the President's 1960 budget message asks for only $280,000, the same amount spent last year.

The budget message does not end the battle for more funds. Doubtless, those seeking the funds will put on what pressures they can in and out of appropriations hearings to gain more research money. What testimony they give during the hearings is not likely to be favorable to pesticides.

* * * * *

Both the National Plant Food Institute and the National Agricultural Chemicals Association are expecting a lively year for state legislation affecting fertilizers and pesticides. The state legislatures of California, Hawaii, and Maryland will convene this month, raising to 20 the number of state legislatures in session. The Louisiana state legislature, which gave pesticides a hard working over last year, will convene in May.

In addition, Delaware and Vermont are re-convening 1959 sessions to clean up left over legislative problems. Both associations are asking members to report any upcoming legislation they feel would be of interest to the industries they represent.

* * * * *

Pesticide industry officials can expect some public reactions involving pesticides and other chemicals from the stress on water pollution clean up planned during National Wildlife Week, March 20-26. Wildlife organization leaders here tell us that the main objective is to motivate the public to clean up rivers and streams to improve fishing, and get better water supplies. Biggest offenders are communities that dump sewage into waterways.

Also culpable are chemical and other industrial firms that disgorge industrial wastes into rivers and streams, killing fish and making drinking water unpalatable. Although of minor national importance, so far, pesticides leached into streams from farm lands can be expected to come in for some local attack now, and possibly some national attention later on.

This clean up campaign will involve use and disposal problems. The U. S. Deparatment of Health, Education and Welfare, as well as some wildlife organizations are involved in the clean up effort.

* * * * *

Release of a study on "fertilizer use by non-farm homes in New England" by the National Plant Food Institute highlights a significant fact for both fertilizer and pesticide producers. Home owners are a sizeable market, and one which can be expanded through promotion.

With 37,715,000 single family dwellings in the U. S., the non-farm home market appears to offer a better market for fertilizers and pesticides than many in the industries realize.★

Bank on bigger profits with the hottest nematode control in the west!

Nemagon®

SOIL FUMIGANT

It pays to sell Nemagon Soil Fumigant. Growers' enthusiastic acceptance of this effective nematode killer makes Nemagon Soil Fumigant the hottest nematicide in the west. As growers' acceptance soars, so do your sales.

Nemagon Soil Fumigant is available for use in both liquid and granular forms. Liquid Nemagon Soil Fumigant can be applied with simple gravity-flow or pressure-feed equipment...it can even be applied in irrigation water.

In dry applications, Nemagon Soil Fumigant can be included in fertilizer and/or seeding operations . . . growers can plant, fertilize and fumigate in one time- and labor-saving operation.

Important, too, Nemagon Soil Fumigant can be applied around the roots of many living plants.

Technical information on Nemagon Soil Fumigant and its application is available. Write to:

SHELL CHEMICAL COMPANY

AGRICULTURAL CHEMICALS DIVISION
460 Park Avenue, New York 6, New York

The AGRICULTURAL *Applicator*

- Helicopter Operator Builds Profits ➡

- Illinois Custom Spray School

- CAAA Meets At Palm Springs

California Applicator Building Profits With

The Bell 47G and 47G-2 are prepared for an early-morning spray run.

Stockton helicopter dusts alongside a tree at the edge of the field.

Helicopter, with special spray boom attachment, covers 34 feet per pass.

By Richard D. Eccles
Vice President and General Manager
Calicopters Division
Stockton Helicopters
Stockton Field, California

ALTHOUGH dramatic helicopter rescues make headlines from coast to coast almost every month, nearly 600 commercial helicopters day in and day out are building profits and cutting costs in business, industry and agriculture. Some 100 helicopter operators are proving every day that the helicopter age is here; that the helicopter not only already is economically feasible but, indeed, is a profit-building tool unequalled in dozens of everyday applications.

These commercial helicopter operators grossed roughly $30,000,000 in 1958, for instance, on a capital investment estimated at approximately the same figure—$30,000,000. These are independent businessmen, building companies, reputations, and business precisely on their ability to make or save money for their customers. Theirs is a solid, sound business—definitely not in the harum-scarum barnstorming class.

Our relatively small helicopter company is one such firm. We began our operation in 1955 with one Bell Model 47G helicopter. We have grown — almost exclusively from our own profits — to the point where we now operate two Bell Model 47G's and four Bell Model 47G-2's. We have a completely equipped maintenance station at Stockton, separate sales offices in San Francisco and Los Angeles, a separate operating base in San Francisco, rolling stock valued at about $15,000, and our own radio communications network covering the San Joaquin and Sacramento Valleys. In addition, we are contemplating major expansion into new fields in 1960.

This growth is attributable to one thing: satisfactory performance for our list of 900 customers. It also demonstrates, we believe, that a sound helicopter operation is a profitable business based on every day dollars-and-cents criteria.

Most of our growth has been based on an agricultural program that is designed to serve the dusting and spraying needs of diversified agriculture in the Sacramento and San Joaquin Valleys. Our Industrial Division, however, is growing more rapidly and we anticipate the day in the near future when our industrial income will be 50% of our total income.

Last year, we did an average of 700 hours of charter work with each of our six helicopters—which is in itself pretty good testimony that customers have found utilization of our machines a profitable investment.

Because of the wide diversification of agriculture in our operating area, we probably have done as much experimental work toward proving the value of the helicopter for aerial chemical application as anyone.

We work some 35 crops, doing everything from direct seeding to defoliation. Frost control, fruit drying, brush control, range seeding, hormone spraying, soil sterilization and selective, non-selective and pre-emergent weed control all are part of the package.

This wide range of work keeps us busy in agriculture for nine to ten months out of the year and has enabled us to build stability and balance in our business.

Our technique in "selling" the helicopter in agriculture has been one of demonstrating and educating. Our agricultural sales manager, Frank Hogan, a vice president of the firm, is a graduate pomologist. He knows farming and the farmer's problems.

Helicopter Operation

Ten gallon per acre mixture is sprayed on field alfalfa, above. Stockton helicopters have applied as many as 130 gallons per acre on certain crops.

In general, our quotations for agricultural application cost are competitive with what a farmer would pay to hire an airplane to do the same job.

We have been able to demonstrate to our customers, including many of the largest farm operations in our area, that when our service is more expensive than other methods it more than pays for its extra cost in terms of quality, end production, and precision application.

Once we have been able to prove our point in a given area by doing work for a leading farm operation, we find that other farmers in the area are convinced. They start calling us.

From the beginning of our operation in 1955, we have cooperated with the University of California's extension service in experiments designed to test the effectiveness of helicopter application. To the last experiment, the helicopter has come out winner.

The helicopter has proven that:

(1) It can give controlled, uniform per-acre coverage of any chemical.

(2) The helicopter covers hard-to-get-to corners and nooks in fields and orchards. (Sometimes, in the case of insecticides, an uncovered corner can become a breeding ground that spawns insect reinfestation of an entire acreage block and results, ultimately, in a second chemical application). Airplanes find difficulty in matching the precision work of the helicopter in some instances.

(3) Penetration of chemicals into crops when spraying or dusting with the helicopter is extremely thorough. We operate our helicopters at speeds ranging from seven to fifty-five miles per hour. As a helicopter flies along at 15 miles per hour, its rotor forces approximately 2,000,000 cubic feet of air per minute down to the crop being covered. Since spray nozzles are directly below the rotor, this serves to "beat in" the chemical being applied.

(4) Drift is less of a problem in helicopter application of chemicals than it is when fixed-wing craft are used.

These abilities begin to make economic sense to the farmer who must pay as much as $4 a pound for certain chemicals. It is not uncommon for chemical costs alone to reach $20 an acre on certain applications. With this kind of investment at stake, he wants those chemicals to go as far and effectively as they can.

Because of the helicopter's ability to adjust speed, there is no limit on the quantity of chemicals sprayed or dusted per acre. We have dusted as little as two pounds per acre of dry formula and as much as 200 pounds per acre. With liquids, we have applied as little as one gallon per acre and as much as 130 gallons per acre.

A specific example or two may show more precisely how the helicopter has done a job for farmers that no other machine could do so effectively in our area.

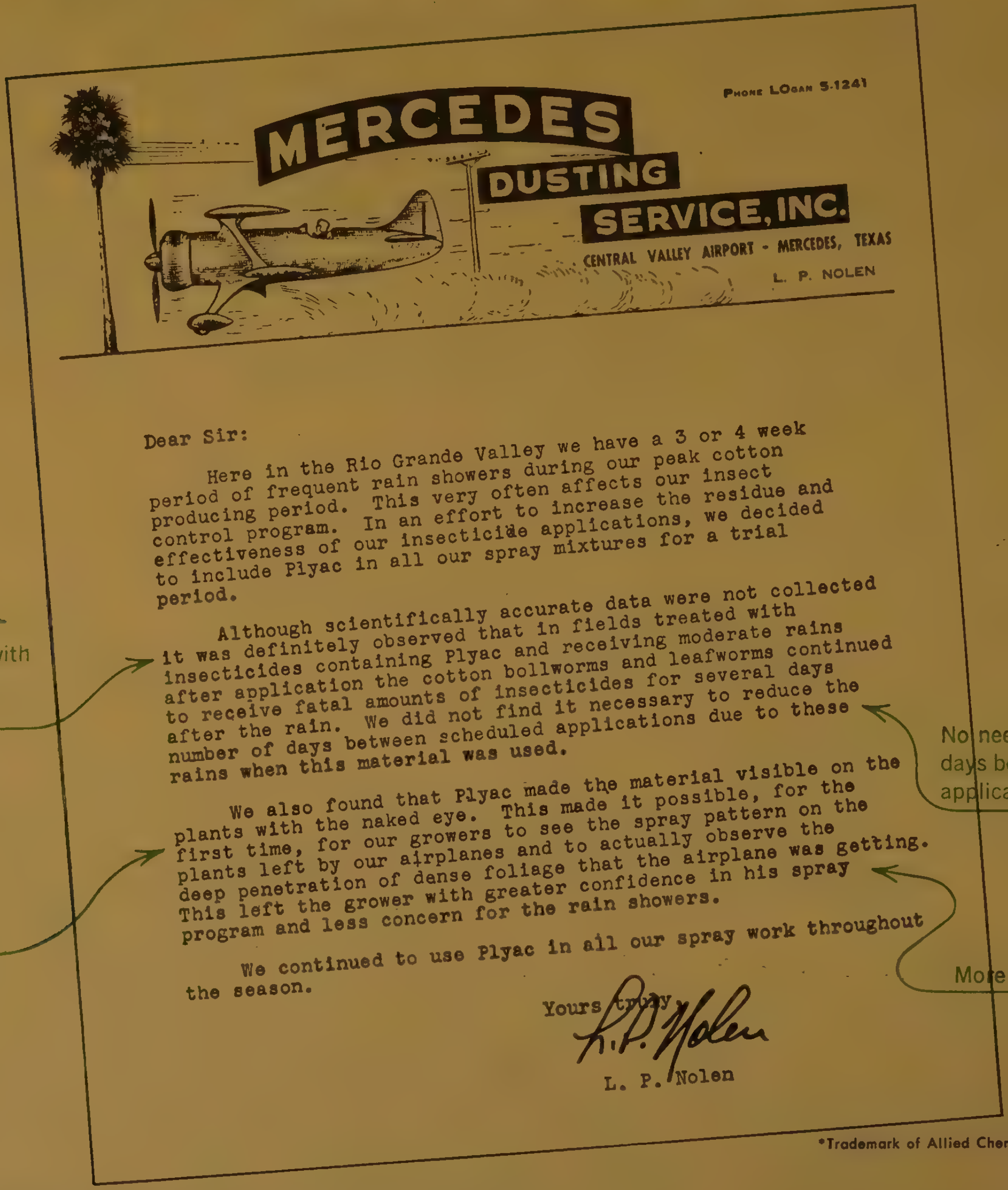
At Brentwood Irrigated Farms in the Diablo Valley of San Joaquin Valley, Contra Costa County, we tried an entirely new concept of pre-emergence weed control in the Spring of 1958. Involved were 500 acres of direct-seeded tomatoes consisting of 350 of shipping tomatoes and 150 of canning to-

(*Continued on Page* 114)

Typical helicopter agricultural operation begins with early morning huddle. Participating are, from left to right: A. R. Houbein, pilot; Florian ByKowski, tanker operator; Paul A. O'Mara Jr.; pilot; and Frank Hogan Jr., agricultural sales manager. All are with Calicopters Div. of Stockton Helicopters.

MORE GROWER CONFIDENCE ...LONGER RESIDUAL KILL

with **PLYAC*** polyethylene spreader-sticker



PHONE LOGAN 5-1241

MERCEDES
DUSTING
SERVICE, INC.
CENTRAL VALLEY AIRPORT - MERCEDES, TEXAS
L. P. NOLEN

Dear Sir:

Here in the Rio Grande Valley we have a 3 or 4 week period of frequent rain showers during our peak cotton producing period. This very often affects our insect control program. In an effort to increase the residue and effectiveness of our insecticide applications, we decided to include Plyac in all our spray mixtures for a trial period.

Although scientifically accurate data were not collected it was definitely observed that in fields treated with insecticides containing Plyac and receiving moderate rains after application the cotton bollworms and leafworms continued to receive fatal amounts of insecticides for several days after the rain. We did not find it necessary to reduce the number of days between scheduled applications due to these rains when this material was used.

We also found that Plyac made the material visible on the plants with the naked eye. This made it possible, for the first time, for our growers to see the spray pattern on the plants left by our airplanes and to actually observe the deep penetration of dense foliage that the airplane was getting. This left the grower with greater confidence in his spray program and less concern for the rain showers.

We continued to use Plyac in all our spray work throughout the season.

Yours truly,

L.P. Nolen

L. P. Nolen

OBSERVED—
insecticides with Plyac don't wash off!

No need to reduce days between applications!

Visible proof of coverage!

More confidence!

*Trademark of Allied Chemical Corporation

Reports similar to the above are pouring in from all over America—testifying to the amazing improvement in spray efficiency you get by adding Allied Chemical's Plyac spreader-sticker. Rain or shine, sprays stick better, kill better! Plyac is a totally new liquid polyethylene spreader-sticker—a non-oil type product. Only 2 to 4 ounces are usually needed for 100 gallons of spray mixture. Find out how you can prolong killing action with Plyac . . . stretch spray effectiveness . . . reduce amount of re-spraying needed. Write today for information.

Allied Chemical

GENERAL CHEMICAL DIVISION
40 Rector Street, New York 6, N. Y.

Control Methods Studied At Custom Spray School

PART ONE OF A TWO-PART MEETING REPORT

THE 12th annual Illinois Custom Spray Operators' Training School was held Jan. 26 to 28 at the University of Illinois in Urbana. Held in conjunction with the school were meetings of the Illinois Aerial Applicators' Association and the Illinois Agricultural Spraying Association.

H. B. Petty, extension entomologist with the UI Agricultural Extension Service and the Illinois Natural History Survey acted as chairman of the school.

J. H. Bigger reported that insect control results achieved with soil insecticides in Illinois during 1959 were good, and that the extension service received excellent cooperation from farmers, farm advisors, spray operators, and others in carrying out its soil insecticide testing program. There were 63 test plots on 40 farms during 1959.

Besides many of the tests which were the result of offered cooperation, Mr. Bigger said, the university made a special effort to secure data relative to control of the grape colaspis and cutworms, especially the black cutworm, with pre-plow soil treatments applied during the winter and spring.

Mr. Bigger pointed to the data in table 1 and said that the figures demonstrate that better results are achieved with broadcast treatments applied shortly before planting and thoroughly disked in than with row treatments applied at planting time, either with special equipment or as fertilizer mixes.

Control with insecticide-fertilizer mixes, liquid or dry, he explained, is shown separately in table 2. The data are divided into two categories and indicate a possible difference between treatments applied at planting time and those applied before spring plowing. Practically all the planting time treatments are row treatments. The pre-plow treatments all are broadcast treatments and were concentrated in the northern area of the state. Pre-plow treatments, Mr. Bigger said, still are in the development stage and are considered very promising but are not yet to be recommended to the exclusion of planting-time broadcast treatments.

Yield increases on treated plots were somewhat higher in 1959 than the five-year average, but this is not unusual for a single year, he pointed out. Pre-plow treatments, as shown in table 3, appeared to be especially good, but Mr. Bigger pointed out that they all were made in a limited area and included most of the fields where rootworms were an important factor in production.

In 1959, he said the experiment station started a series of tests applying insecticide by airplane pre-plow. He said that the results in 1959 were inconclusive put promising. Some trouble was experienced with lumpy granules and it is planned to continue these

(*Continued on Page* 111)

Table 1—Control of Insects in Cooperators' Fields. Planting Time Treatment 1959

	Percent Control		
Insect involved	14 broadcast treatments	21 row treatments	All treatments
Wireworms	72.2	71.1	71.4
White grubs	100.0	50.0	80.0
Cornfield ant	90.0	65.2	76.7
Corn root aphid	100.0	80.0	90.0
Rootworms	87.5	64.7	71.5

Table 2—Control of Insects with Insecticide-fertilizer Mixtures - 1959

Insect involved	Treated at Planting time 12 fields	Pre-plow treated 7 fields[1]
Wireworms	63.6	100.0
White grubs	50.0	100.0
Cornfield ant	100.0	100.0
Corn root aphid	100.0	100.0
Rootworms	83.7	95.1

[1] Does not include airplane treatments

Table 3—Yields on Soil Treatment Fields - 1959 Areas Treated at Planting Time

Method of treatment	Number of fields	Treated area	Untreated area	Gain for treatment	Percent gain
Broadcast	10	90.2	83.9	6.3	7.5
Row	6	83.6	79.0	4.6	5.8
Pre-plow	7	115.7	106.2	9.5	9.0

TED VENEGAS, MANAGER OF T. F. McLOUGHLIN CROP DUSTERS INC., OXNARD, CALIFORNIA, SPRAYS BEANS FOR INSECT CONTROL—DDT AND TOXAPHENE, 10 GAL./ACRE, 35 FT. SWATH. VENEGAS ADDITIONALLY USES HIS SWATHMASTER EQUIPPED STEARMAN ON CITRUS AND OTHER VEGETABLE CROPS, FERTILIZING OF RANGE AND BARLEY FIELDS AND FOR RESEEDING OF BURNED WATERSHED AREAS.

DO MORE AND BETTER JOBS...

USE A SELLERS *Swathmaster*

Would you like to dust or spray, seed or fertilize by only a simple resetting of the control in your cockpit...without any time lost for equipment conversion and maintenance or without hauling a combination dust-spray applicating rig and its added weight and drag?

It's easy with the remarkable all-purpose Swathmaster. You can land after dusting and take-off again as a sprayer, delayed only by the time required to refill the hopper.

The F.A.A. approved Swathmaster can dispense any material...dry or liquid, seed or fertilizer...without streaking. Its gate action is positive to start your material flowing instantly at the edge of the field, to give a uniform and calibrated flow onto the crop, and to stop the flow instantly at the end of the run... eliminating "dribble" in the turns.

More than 100 operators are using one or more stainless steel Swathmasters to profitable advantage, and at the same time are applying a more uniform coverage and are getting a more thorough penetration of materials into the foliage for their growers.

Write, wire or telephone today for our free brochure and 16 mm loan film. They explain how the Swathmaster will do more and better jobs for you.

U.S. PATENT 2,772,061 AND
MEXICAN PATENT 55,933

MANUFACTURED AND DISTRIBUTED BY

TRANSLAND AIRCRAFT

2600 WEST 247TH STREET • TORRANCE • CALIFORNIA
TELEPHONE: DAVENPORT 68110

ALSO DISTRIBUTED BY

SELLERS AVIATION INC.
1515 CRESTMONT DRIVE
BAKERSFIELD, CALIFORNIA
PHONE: FAIRVIEW 2-5184

Mississippi Meeting Feb. 12

THE annual meeting of the Mississippi Aerial Applicators Association will be held Feb. 12 and 13 at the Buena Vista Hotel in Biloxi. Among those scheduled to appear on the program is Robert E. Monroe, executive director, National Aviation Trades Association, who will speak on trends affecting aerial applicators.

Other speakers include: Joseph J. Werbke, Federal Aviation Agency, Fort Worth, Texas, "The Trend of Aerial Application Volume"; J. A. McCausland, FAA, Washington, D. C., "FAA Changes Affecting Aerial Applicators"; and C. A. Moore, Mississippi Aeronautics Commission, "State Legislation for Aerial Applicators".

New business opportunities in agricultural aviation will be covered by Harvey Grisham of the Coahoma Chemical Co., Clarksdale, Miss. B. F. Smith, executive vice president of the Delta Council, Stoneville, Miss., will discuss the need for publicity and public relations; and A. G. Bennett, extension entomologist, Mississippi State University, will lead a discussion on extension services and how they can be of service to aerial applicators.

J. T. Maxwell, Soil Conservation Service, Jennings, La., will talk on the advantages of aerial application in soil conservation programs; and Frank Wignall, FAA Inspector, Jackson, Miss., will discuss trends of aerial applicator accidents.

Also on the program are Dr. Marvin E. Merkel, USDA Entomologist, Stoneville Experiment Station, Stoneville, Miss., "Coordination Between Aerial Applicators and the State Plant Board", and B. W. Ewing, "What the Customer Expects of the Aerial Applicator".

•

Louisiana Applicators Meet

The fifth annual Louisiana Agricultural Aerial Applicators' Conference was held Jan. 21 and 22 at Louisiana State University, Baton Rouge. Kirby L. Cockerham, extension entomologist at LSU, was general chairman of the conference.

Among the speakers and their topics were: Dr. A. W. Raspet, Mississippi Experiment Station, "Needed Research for Aerial Applicators Aircraft and Equipment"; E. A. Epps, state chemist, "Regulations Governing Pesticide Formulations"; Roe E. Duggan, U. S. Food and Drug Administration, "Pesticide Residues on Human and Animal Foods"; and Thomas Hansbrough, assistant forestry professor, and Hadley Fontenot, county agent, Cameron Parish, La., "Developments in Weed Control." A full report on the conference will follow in the March issue of *Agricultural Chemicals.*

•

Ag. Aviation Conference

The 9th annual Agricultural Aviation Conference will be held at Texas A&M College, Feb. 21-23.

Boom Control Valve

A boom control valve for pressures up to 300 psi has been added to the product line of the Delavan Manufacturing Co., West Des Moines, Iowa. It is being marketed under the trade designation of Delavan 9000 Series Select-A-Spray.

The operating principle of Delavan's standard control valve remains the same but the company has restyled the face plate and has added positive settings to each of the eight spraying positions. Select-A-Spray is available in four models to fit all inlet, bypass, and outlet requirements.

The valve can be serviced in the field without removing it from the sprayer.

Possibility of Licensing Told at Kansas Meeting

A POSSIBILITY in the future will be that only licensed people can apply pesticides to crops, according to Philip H. Marvin, entomologist for Robert S. Wise, Co., Wichita, Kansas, who addressed the annual meeting of the Kansas Aviation Trades Association, Jan. 13-14, in Wichita.

Speaking on the Miller Law and how it affects the applicator, Mr. Marvin said most seizures of contaminated crops have been due to farmers mis-applying pesticide chemicals — of not following label recommendations. In the future, he said, a man may have to take an examination and prove his qualifications to apply pesticide chemicals and an unlicensed farmer could not even spray his own fields.

Mr. Marvin pointed out that a situation similar to this now exists in California where, in some areas, only qualified personnel can make 2,4-D applications, and then only with the direct permission of the county commissioner of agriculture for each spray job. Highly toxic materials, he said, can be used only with the permission of the county agricultural commissioner. Such materials can be purchased only with written consent of the commissioner, and then only in sufficient quantities to do a designated spraying on a designated field, Mr. Marvin continued.

Protection, Mr. Marvin declared, must be assured so that the use of pesticides does not impair the health of consumers through residues and so far the record has been excellent. However, he warned, some people substituting "zeal for judgment" and "noise for knowledge" may misrepresent a few errors as being common practice. In closing, Mr. Marvin recommended that, if, in the future, any group is assigned to make applications correctly, the commercial applicators would be foremost in knowing how to read and follow a label so that any residue would be below the legal tolerance at harvest time.

Pest killers you can safely use and recommend!

DITHANE M-22 (maneb) is the newest and most effective fungicide in the DITHANE family . . . the most versatile and widely used of all agricultural fungicides. If you haven't yet tried this proved fungicide on a wide variety of fruits and vegetables, you're in for a pleasant and profitable surprise.

KELTHANE miticide is today's most effective and longest-lasting protection against troublesome mite species, including "resistant" strains. New lower cost makes KELTHANE your best bet for safe, sure control of mite populations in fields, orchards and groves.

DITHANE Z-78 (zineb) is the No. 1 fungicide for controlling Greasy Spot and Russeting on citrus fruits. Sulfur applications are unnecessary when you concentrate on DITHANE Z-78 . . . the safe, easy-to-use citrus fungicide.

See your Rohm & Haas field man . . . or write direct for complete information on these pesticides, as well as PERTHANE, RHOTHANE and LETHANE insecticides; KARATHANE fungicide; and TRITON spreader-sticker.

DITHANE, KELTHANE, PERTHANE, LETHANE, RHOTHANE, KARATHANE *and* TRITON *are trademarks, Reg. U.S. Pat. Off. and in principal foreign countries.*

Chemicals for Agriculture

ROHM & HAAS
COMPANY
WASHINGTON SQUARE, PHILADELPHIA 5, PA.

New CAAA officers (left to right): Seated, Monty Landseidel, vice president; James K. Vedder, president; and Wayland Fink, treasurer. Standing, Vince Biddleton, George Baldrick, and James French, directors.

Pending FAA Legislation Outlined at CAAA Meeting

by Edward J. Meier

West Coast Representative
Agricultural Chemicals

Part I of a Two-Part Report

MORE than 400 conventioneers seeking additional information on their industry, additional news of product developments and additional sunshine, met at El Mirador Hotel, Palm Springs, January 14-16 for the 10th annual convention of the California Agricultural Aircraft Association.

They were told in an opening technical session that, perhaps before 1960 closes, new Federal Aircraft Agency regulations concerning their industry will be enacted covering pilot competency and organization supervision. Jay McCausland, agricultural industry specialist for the FAA, Washington, D.C., said that "scare" headlines in the nation's press over the years, on the use of chemicals in agriculture, created pressure that was brought to a head with the creation of the FAA last July. Reading excerpts from the Act, the speaker quoted from section 307C, saying in effect that the Act authorizes the administrator to be concerned with the protection of persons and property on the ground. This is a new concept, not only protection from each other while in the air, but also on the ground. The administrator has clear direction to act in this interest, the speaker said.

What form will legislation take? According to Mr. McCausland, it will have to be some minimum standard for all the states of the union. California happens to have a very strict code on pesticides and herbicides. A prospective FAA regulation must be one that applies to forestry work, cranberry treatment, etc. Two main points causing complaints, law suits, etc., are:

(1) Pilot competency. The best way to handle this problem will probably be to put the responsibility on the operator just like the airline industry operations, Mr. McCausland said. Operators would be required to impart competence to pilots for the particular type of operation. The operator deserves some privileges for doing this and it may take the form of an Air Agency Certificate. This will lead to elimination of the waiver, under which agricultural pilots operate at present.

(2) Supervision is the second item of interest. Proper lines of supervision within the organization will be necessary.

The FAA now feels that with these points covered, that this will more or less solve the problems of drift damage, complaints on damage to persons and property on the ground, etc.

The National Aviation Trades Association has asked to be in on the drafting of the regulations and they will definitely be included, Mr. McCausland said. Ideas for new FAA regulations should be submitted to Lloyd Nolen of the NATA and funnelled thus to the FAA.

In the question and answer period that followed, the speaker was asked: What is FAA doing on the operation of agricultural aircraft in "control" zones?

Mr. McCausland said that rights and privileges will be written into the new regulations and that, obviously, clearance will be necessary to operate in control zones. The speaker doesn't foresee much trouble. Perhaps radio gear may be necessary when in approach or control zones but it is realized that electrical equipment on the aircraft may be an additional burden on operators. This situation of control zone operation is expected to be a very small part of the total operation of the agricultural aircraft operators business.

In answer to the question: "Just what is an Air Agency Certificate?" the speaker said that FAA might turn to a competency program whereby men go through brief training or refresher courses for proficiency at the start of the season. FAA may ask operators to write a manual defining lines of responsibility in their organization and submit a workable, realistic document. Periodically, FAA would check to see if all is being done as described in the manual.

The Air Agency Certificate will have much more value and will be a real asset compared with the present waiver, Mr. McCausland said. The waiver has the implication of something unsafe. The industry will be in a better defensive position with an Air Agency Certificate. Suits will continue but court rulings in favor of operators may persuade lawyers to advise clients not to bring suit in some cases, it was thought by Mr. McCausland.

Also, an insurance executive said that the Certificate system will definitely strengthen the industry. There was the implication, the speaker noted, that fewer law suits and damage claims might result in more favorable rates.

Because the California agricultural aviation group now is the largest in the U.S., Mr. McCausland said his agency is, in a sense, using it as a sounding board for many of the tentative rules that may be adopted later.

"Our main interest in adopting rules for the industry is to see that the beginner in the business and the uninformed operators live up to the good flying practices already in use by the majority of the operators.

"We are not out to put anyone out of business," Mr. McCausland said, "and our regulations will govern only working practices—they are not economic."

Pilot Shortage Feared

"The average age of agricultural pilots is in the late 30's, and in another five years a shortage of experienced pilots in our industry will become critical," said James K. Vedder, president of the Association. According to Ira Seiden, first executive manager of the organization: "Just knowing how to fly a plane doesn't make an agricultural pilot."

It was pointed out that, at the present time, California doesn't have a single school for agricultural pilots. The only school in the far west is in Minden, Nevada, and there is one which operates periodically at Texas A&M University.

Association members said that the training of new pilots by the individual operator is costly both in time and money, and there is no guarantee that the student, upon completion of his course, is going to prove to be a pilot adaptable to agricultural aviation work.

John F. Neace of Litchfield Park, Arizona, agricultural aircraft operator and member of President Eisenhower's aviation manpower board, pointed out that the training of the pilots could be inaugurated in any of the west's land grant colleges if money was available. He pointed out that the University of California at Davis has for some time, considered such a program.

Part II of "Agricultural Chemicals" report on the CAAA Convention will appear in the March issue.

Many Agricultural Aircraft Operators insist on Randolph Butyrate Finishes!

Randolph Butyrates stay taut and last for years

Randolph Chromated Enamel for metal aircraft surfaces . . . made with chromate pigment to maintain a non-corrosive surface

Name of Your local distributor sent on request Write

Randolph PRODUCTS COMPANY CARLSTADT, NEW JERSEY

AGRICULTURAL CHEMICALS

offers practical features on manufacturing processes, market information, merchandising aids, survey data, and technical and toxicological data on agricultural chemicals. Also included are monthly features by industry experts on topics of current interest, reviews of technical literature, new industry products, equipment, and bulletins and news about the agricultural chemicals industry.

CLIP AND MAIL TO

AGRICULTURAL CHEMICALS, P. O. Box 31, Caldwell, N. J.
Please enter subscription(s) as follows:
(Check or money order enclosed)

☐ One year, $3.00 (Canada $4.00; Foreign $9.00)
☐ Two years, $5.00 (Canada $7.00; Foreign $15.00)

NAME ....
(Please Print)

FIRM ....

STREET ....

CITY ....

Arcadian® News

Volume 5 For Manufacturers of Mixed Fertilizers Number 2

ARE YOU READY FOR THE SPRING RUSH?

The spring rush is just ahead! Every indication points to another big fertilizer year, with your sales dependent on how fast you can get the tonnage out. Right now is the time to take steps to make sure that your plant and operation is in shape to keep mixed goods moving. Plan, schedule and repair now to avoid slow-downs, break-downs and stoppages later.

To do the best job of preparing for the spring season, concentrate on three areas: *your dealers and their customers, your inventory,* and *your production.*

Urge Early Delivery

Do your best to convince dealers and farmers to stock up in advance of actual need. Point out that it's better to have fertilizer stored in the barn or warehouse when needed than to be at the mercy of rush season deliveries. Dealers should encourage farmers to determine and order their various analyses as far in advance as possible. By the same token, you, yourself, should order raw materials so that they are on hand *before* you need them. This will assure your having the right supplies—especially those materials that might become short during the spring season.

Make it a point to urge dealers to put in bulk handling equipment, and suggest that they have a fast means of loading customer's orders during the inevitable rush period. Make a dealer survey to determine what grades and amounts will be needed. Try to get some idea of how much will be in bags, how much in bulk.

Boost Your Inventory

Fill your inventory to capacity. As insurance, take additional warehousing facilities in areas of heaviest springtime demand. When the rush is on, some misguided manufacturers run their plants at night and bag and ship during the day. This can result in delivering a product that is not well-cured. So, get as much storage as possible for your bagged fertilizer.

Eliminate Shut-Downs

Of course, all the planning and scheduling on behalf of inventories, product demands and storage, raw materials, etc., are to no avail when production falters and stalls during the spring rush. But, fortunately, by taking precautions now, costly breakdowns and tonnage-cutting slow-downs can be avoided. Look for these key "troubles"... apply the preventive maintenance indicated:

Frozen air lines—Air compressors deposit a lot of water during steady operations, and if this water freezes, it could plug or crack air lines, or damage the compressor itself. Some plants have lost a whole day correcting frozen airlines. ***How to prevent:*** Drain air lines frequently. Avoid low pockets when installing lines. Observe the precautions against applying heat to nitrogen solution equipment.

Valve diaphragm failure—Leaking inlet valves can cause bad working conditions, foul the mixer, and contribute to poor condition of the fertilizer. There have been some baffling and costly cases of low analysis where the valve ahead of the measuring tank leaked only during the time solution was being forced into the mixer. Pressure was strong enough to return some of the solution to the railroad car, and it was impossible to see this happening. ***How to prevent:*** An inlet valve leak can be discovered by watching for any change in the liquid level of the measuring tank while the tank has its maximum operating pressure with no solution valve open. Valve diaphragms should be replaced as routine procedure well before failure might be

expected. This preventive maintenance is well worth the small cost involved.

Clogged gauge glasses—Restricted flow in gauge glasses causes almost all of the faulty proportioning that occurs as materials flow through measuring tanks. ***How to prevent:*** Keep *all* gauge glass connections free and open by removing the plugs and cleaning the passages with a wire brush and water. Any "creeping" of the level in a gauge glass after the valves are closed indicates clogging and should be the signal for immediate cleaning. Also, producers should see to it that gauge glasses are protected from accidental breakage, and that spare glasses are kept on hand.

Leakage to and from batch mixers—A long list of troubles stem from leakage of materials into or out of batch mixers. These troubles include: excess fumes, faulty analysis, and even fires where substantial quantities of sulphuric acid and nitrogen were used. ***How to prevent:*** Check mixer inlet and outlet doors regularly for leakage and wear of operating mechanism.

Fouled rotary mixer—It's quite common for the rotary mixer to get so fouled between the flights that it neither mixes nor discharges on schedule. Under such conditions, proper ammoniation becomes impossible. Many factors contribute to this fouling, especially these three:

1. **Adding nitrogen solution or acid to the mixer when only superphosphate is present.** Even if distributor pipes were correctly drilled to accommodate the unusual density pattern in the mixer under these conditions, the mass would still be excessively sticky from heat and probably moisture—especially where damp superphosphate and nitrogen solutions with relatively high moisture content are used. ***How to prevent:*** Have *all* of the dry ingredients in the mixer before adding nitrogen solution or acid.

2. **Adding nitrogen solution to the dry ingredients as they enter the mixer.** This not only fouls the mixer, but also contributes to poor working conditions, and lowers the quality of the fertilizer. ***How to prevent:*** As above, put all the ingredients into the mixer *first*—then add the liquids.

3. **Solution or acid leakage into an empty batch mixer.** Such leaks prepare the surfaces of the mixer for rapid build-up and quick corrosion. The trouble may be in leaking valves, or in long runs of piping from the measuring tank or meter to the mixer. ***How to prevent:*** Fix leaking valves. Install an air purge in a long run of pipe to make sure that all the solution enters the mixer during the mixing cycle.

Mis-use of withholding hopper—Where producers foolishly leave the gate of the withholding hopper open at all times, allowing materials to flow directly into the mixer, trouble is inevitable. Among the problems this can cause are: Faulty analysis, poor condition, and excessive fumes. ***How to prevent:*** Use the hopper as it was intended to be used.

Failure to rehandle—Although rehandling of pulverized goods to improve physical condition is generally practiced, a few producers try to eliminate this step in the spring. It usually turns out to be a costly shortcut. ***How to prevent: Always*** rehandle pulverized goods.

Common granulation troubles—Producers who turn out granulated goods usually run into these problems: failure to get granulation started, drop-off of granulation after it has started, fouling of the mixer and dryer, overloading of the hammer mill, blinding of screens, excess of moisture and heat in the stored product. Also, fires in the mixer continue to cause delays, as well as jeopardize safety. ***Some preventive measures:*** Many operators shorten start-up time by warming the equipment as far ahead of start-up time as practical, and by starting with about the same amount of recycle that experience has shown to be normal . . . Regulated recycle aids smooth operation about as much as any one factor in granulation . . . By starting a little on the dry side and gradually building up to the desired liquid phase, the prospects of fouling equipment early in the day will be greatly minimized.

Premature granulation in the ammoniator—If it is continuous, premature granulation can contribute its share of production slow-downs. Some of the causes are excessive use of sulphuric acid, combined with high ammoniation rates—especially with the "wetter" acids and nitrogen solutions. Of course, in some cases, this may be deliberate, to obtain the heat that promotes granulation. ***How to prevent:*** Two of the best ways to curb premature granulation is to use materials with low moisture content and provide for uniform recycle.

Excessive use of acid—Faulty ammoniation equipment or techniques will lead to use of overly large quantities of acid to take up the ammonia that is not reacted with the superphosphates. ***How to prevent:*** Make daily inspections of all liquid distributing equipment.

Inadequate dryer operation—Where

Scrubbing Assures Clean Cars for You

Washing and inspection of Nitrogen Division tank cars before reloading with Nitrogen Solutions for delivery to you is a standard part of Nitrogen Division service. Here a string of tank cars enters the wash rack station.

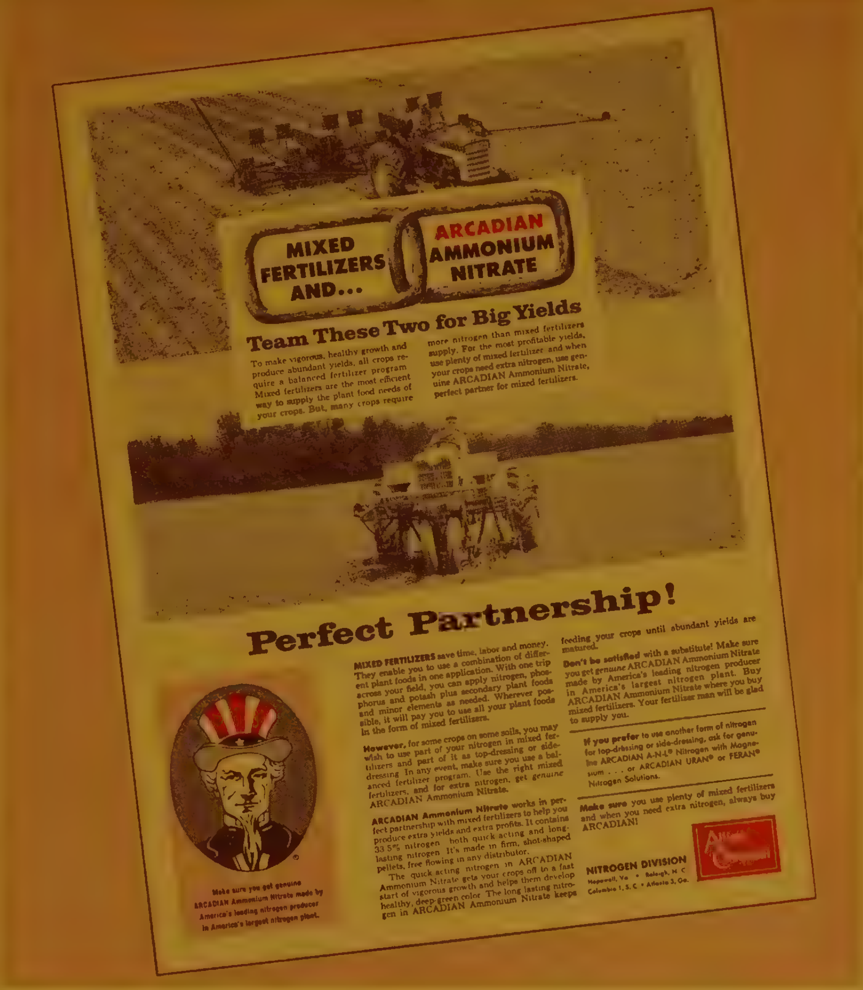
rotary dryers do not perform as well as they should, excess acid in some units is expected to do much of the work of the dryer in granulation and drying. This is particularly true with a counter-current dryer that is inadequate. Here there is too little hot air being forced through the length of the dryer. This usually happens because an enormous amount of air leakage at the fertilizer inlet end causes air to leak directly to the suction fan, thus by-passing the burner end of the dryer. Failure to correct this leads to excess moisture in the stored goods—with all the troubles that this condition can impart to fertilizer. *How to prevent:* Eliminate air leakage. Also, check fan blades, air ducts and dust collectors for build-up that restricts air flow.

Excess fines—Damp fertilizer quickly blinds the screen, which results in too great a quantity of fines delivered to the pile. This will influence the amount of recycle in many systems. *How to prevent:* Check your fines screen—it may be too fine for the grade you are producing. Also, check your procedure to see if you can produce less fines.

Semi-granulation troubles—Producers sometimes find that their semi-granulated goods do not hold up as well as expected. This could be the result of inability to hold the moisture content to a trouble-free level at all times. Also, shut-downs in semi-granulations may be caused by failure to get desired granulation . . . or by fouling of equipment, particularly the mixer, and, at times, the bucket elevators. Operating conditions are frequently near the point where fouling is an ever-present threat, and some adjustment may be necessary to compensate for the variables found in materials, plant temperatures, weather, etc. Since semi-granulation production *is* so sensitive to so many variables, operators must be very alert and adhere strictly to correct operating procedures. If they prove careless, there is a real danger of fires breaking out in the mixer. *How to prevent:* Every effort should be made to permit discharging the mass as early and as quickly as conditions demand.

Ask Nitrogen Division

Your Nitrogen Division technical service man is familiar with methods and materials that speed production of good-quality mixed fertilizers. Getting his advice and assistance now may help you to mix and ship more tonnage during your peak period. This service is available to customers without charge. Simply contact Nitrogen Division, Allied Chemical, 40 Rector Street, New York 6, N.Y.



MIXED FERTILIZERS AND...

ARCADIAN AMMONIUM NITRATE

Team These Two for Big Yields

To make vigorous, healthy growth and produce abundant yields, all crops require a balanced fertilizer program. Mixed fertilizers are the most efficient way to supply the plant food needs of your crops. But, many crops require more nitrogen than mixed fertilizers supply. For the most profitable yields, use plenty of mixed fertilizer and when your crops need extra nitrogen, use genuine ARCADIAN Ammonium Nitrate, perfect partner for mixed fertilizers.

Perfect Partnership!

MIXED FERTILIZERS save time, labor and money. They enable you to use a combination of different plant foods in one application. With one trip across your field, you can apply nitrogen, phosphorus and potash plus secondary plant foods and minor elements as needed. Wherever possible, it will pay you to use all your plant foods in the form of mixed fertilizers.

However, for some crops on some soils, you may wish to use part of your nitrogen in mixed fertilizers and part of it as top-dressing or side-dressing. In any event, make sure you use a balanced fertilizer program. Use the right mixed fertilizers, and for extra nitrogen, get genuine ARCADIAN Ammonium Nitrate.

ARCADIAN Ammonium Nitrate works in perfect partnership with mixed fertilizers to help you produce extra yields and extra profits. It contains 33.5% nitrogen—both quick acting and long-lasting nitrogen. It's made in firm, shot-shaped pellets, free flowing in any distributor.

The quick acting nitrogen in ARCADIAN Ammonium Nitrate gets your crops off to a fast start of vigorous growth and helps them develop healthy, deep-green color. The long lasting nitrogen in ARCADIAN Ammonium Nitrate keeps feeding your crops until abundant yields are matured.

Don't be satisfied with a substitute! Make sure you get *genuine* ARCADIAN Ammonium Nitrate made by America's leading nitrogen producer in America's largest nitrogen plant. Buy ARCADIAN Ammonium Nitrate where you buy mixed fertilizers. Your fertilizer man will be glad to supply you.

If you prefer to use another form of nitrogen for top-dressing or side-dressing, ask for genuine ARCADIAN A-N-L® Nitrogen with Magnesium . . . or ARCADIAN URAN® or FERAN® Nitrogen Solutions.

Make sure you use plenty of mixed fertilizers and when you need extra nitrogen, always buy ARCADIAN!

Make sure you get genuine ARCADIAN Ammonium Nitrate made by America's leading nitrogen producer in America's largest nitrogen plant.

NITROGEN DIVISION
Hopewell, Va. • Raleigh, N.C.
Columbia 1, S.C. • Atlanta 3, Ga.

HOW WE PROMOTE YOUR PRODUCTS

This year, as every year, Nitrogen Division is stressing the importance of a balanced fertilizer program in crop production. The typical page advertisement shown here, which appears in leading farm magazines, shows how the ARCADIAN® Ammonium Nitrate campaign features the teamwork of mixed fertilizers and nitrogen top-dressing or side-dressing.

This consistent policy of emphasizing the need for mixed fertilizers makes this Allied Chemical campaign the "perfect partner" for your own promotion and sales program. Here's what the lead-off copy in this page advertisement says:

"Team these Two for Big Yields"

"To make vigorous, healthy growth and produce abundant yields, all crops require a balanced fertilizer program. Mixed fertilizers are the most efficient way to supply the plant food needs of your crops. . . . For the most profitable yields, use plenty of mixed fertilizer, and when your crops need extra nitrogen, use genuine ARCADIAN Ammonium Nitrate."

The balance of the sales message also sells mixed fertilizer in statements such as these:

"Plowed down and in the row, mixed fertilizers save time and labor in feeding your crops several needed plant foods in one application."

"ARCADIAN Ammonium Nitrate works in perfect partnership with mixed fertilizers to make your crops produce bigger yields and profits."

"Make sure you use plenty of mixed fertilizers and when you need extra nitrogen, always buy ARCADIAN!"

Yes, Nitrogen Division, Allied Chemical, is constantly featuring your mixed fertilizers in its own advertisements to your customers, the farmers. This is only one of many valuable services Nitrogen Division provides. Call Nitrogen Division when you need nitrogen materials and service.

HERE'S THE BIG LINE OF Arcadian NITROGEN SOLUTIONS

When you purchase your nitrogen requirements from Nitrogen Division, Allied Chemical, you have many different nitrogen solutions from which to select those best suited to your ammoniation methods and equipment. You are served by America's leading producer of the most complete line of nitrogen products on the market. You get formulation assistance and technical help on manufacturing problems from the Nitrogen Division technical service staff. You benefit from millions of tons of nitrogen experience and the enterprising research that originated and developed nitrogen solutions.

	CHEMICAL COMPOSITION %						PHYSICAL PROPERTIES		
	Total Nitrogen	Anhydrous Ammonia	Ammonium Nitrate	Urea	Water	Neutralizing Ammonia Per Unit of Total N (lbs.)	Approx. Sp. Grav. at 60°F	Approx. Vap. Press. at 104°F per Sq. In. Gauge	Approx. Temp. at Which Salt Begins to Crystallize °F
NITRANA®									
2	41.0	22.2	65.0	—	12.8	10.8	1.137	10	21
2M	44.0	23.8	69.8	—	6.4	10.8	1.147	18	15
3	41.0	26.3	55.5	—	18.2	12.8	1.079	17	−25
3M	44.0	28.0	60.0	—	12.0	12.7	1.083	25	−36
3MC	47.0	29.7	64.5	—	5.8	12.6	1.089	34	−30
4	37.0	16.6	66.8	—	16.6	8.9	1.184	1	56
4M	41.0	19.0	72.5	—	8.5	9.2	1.194	7	61
6	49.0	34.0	60.0	—	6.0	13.9	1.050	48	−52
7	45.0	25.3	69.2	—	5.5	11.2	1.134	22	1
URANA®									
6C	43.0	20.0	68.0	6.0	6.0	9.3	1.180	12	39
6M	44.0	22.0	66.0	6.0	6.0	10.0	1.158	17	14
10	44.4	24.5	56.0	10.0	9.5	11.0	1.114	22	−15
11	41.0	19.0	58.0	11.0	12.0	9.2	1.162	10	7
12	44.4	26.0	50.0	12.0	12.0	11.7	1.087	25	− 7
13	49.0	33.0	45.1	13.0	8.9	13.5	1.033	51	−17
15	44.0	28.0	40.0	15.0	17.0	12.7	1.052	29	1
U-A-S®									
A	45.4	36.8	—	32.5	30.7	16.2	0.932	57	16
B	45.3	30.6	—	43.1	26.3	13.5	0.978	48	46
Anhydrous Ammonia	82.2	99.9	—	—	—	24.3	0.618	211	−108

Other ARCADIAN® Products: URAN® and FERAN® Solutions • Ammonia Liquor • N-dure® A-N-L® • Ammonium Nitrate • UREA 45 • Nitrate of Soda • Sulphate of Ammonia

NITROGEN DIVISION

MAIN OFFICE: 40 RECTOR ST., NEW YORK 6, N. Y., PHONE HANOVER 2-7300

Allied Chemical

Hopewell, Va., P. O. Drawer 131 ... Glenview 8-6301
Ironton, Ohio, P. O. Box 98 ... Drexel 7-4366
Omaha 7, Neb., P. O. Box 166 ... Bellevue 1464
Raleigh, N. C., 606 Capital Club Bldg. ... Temple 3-2801

Columbia 1, S. C., 1203 Gervais St. ... Alpine 3-6676
Atlanta 3, Ga., 127 Peachtree St., N. E. Jackson 2-7805
Memphis 9, Tenn., 1929-B South 3rd St. Whitehall 8-2692
Columbia, Mo., 1134 Highway 40W ... Gibson 2-4040

Indianapolis 20, Ind., 6060 College Ave. Clifford 5-5443
Kalamazoo, Mich., P. O. Box 869 ... Kalamazoo 5-8676
St. Paul 14, Minn., 764 Vandalia St. ... Midway 5-9141
San Francisco 4, Cal., 235 Montgomery St. Yukon 2-6840

PEST ROUNDUP

By Kelvin Dorward

This column, reviewing current insect control programs, is a regular feature of AGRICULTURAL CHEMICALS. Mr. Dorward is head—Survey & Detection Operations, Plant Pest Control Division, U. S. Department of Agriculture. His observations are based on latest reports from collaborators in U.S.D.A.'s pest surveys throughout the U.S.

European Corn Borer Survey Finds Counts Generally Lower

THE 1959 fall European corn borer survey was conducted by agricultural agencies in 20 states. The survey was conducted during late summer and fall in order to include a high percentage of mature larvae.

European corn borer counts were generally lower in the control states in the 1959 fall survey than in the 1958 survey. Decreases were most notable in Iowa, Kansas, Missouri, Nebraska, and North Dakota, where the number of borers per 100 corn stalks averaged 99, 48, 36, 116 and 125, respectively, compared with 166, 135, 96, 177, and 219 in 1958. Slight decreases were recorded in Illinois and South Dakota whereas increases, though slight, were noted in Indiana, Minnesota, Ohio, and Wisconsin. Michigan populations were about the same as in 1958.

Borer populations were generally higher in the eastern states than the 1958 fall survey with the exception of Virginia, where 182 larvae per 100 stalks were found in 1959 and 252 in 1958. In Delaware and New Jersey counts averaged 394 and 271 per 100 corn stalks, respectively, compared with 249 and 169 in 1958. The counts of 722 in Mercer County, and 568 in Middlesex County, New Jersey, were the highest county averages recorded during the 1959 survey. Population counts slightly higher than in 1958 were recorded in Pennsylvania, West Virginia and New York.

The average number of European corn borers per 100 plants for the country as a whole, based on comparable districts or counties surveyed, decreased from 106 in 1958 to 102 in 1959.

The most important new European corn borer distribution record for 1959 was the finding of a specimen in Bowie County, Texas. This was the first time the insect had been taken in Texas. In addition to the new find in Texas, infestations were found for the first time in 1959 in 12 other counties. These counties were distributed as follows: one each in Alabama, Colorado, Georgia and Michigan, 6 in Arkansas, and 2 in North Carolina.

Miscellaneous Insect Activity

GENERAL insect activity was very limited in December, 1959. Heavy infestations of the harlequin bug caused severe damage to mustard, turnips and radishes in the lower Rio Grande Valley of Texas. The cabbage looper, salt-marsh caterpillar and a false chinch bug were recorded as being from light to medium on various vegetables in the same area. Heavy, widespread infestations of the western flea beetle on turnips were reported from Dimmit and Zavala Counties, Texas.

A heavy infestation of the cowpea weevil was reported in black-eyed peas in the Ducor, Tulane County, California area. Heavy infestations of the strawberry crown moth on loganberry were reported from Watsonville, Santa Cruz County, California, and medium infestations from raspberry plants in Vallejo, Solano County.

Greenbug infestations on small grain in Oklahoma remained light during December, and populations of the spotted alfalfa aphid in the north central area of the state were reduced by rains. The winter grain mite caused damage to small grain fields in Hunt, Kaufman, Rockwell, Collin, and Ellis Counties, Texas and medium to heavy populations were recorded in Johnson and Cook Counties.

Boll Weevil Hibernation Up

IN the January issue of this magazine, results of the cotton boll weevil fall hibernation survey, with the exception of North and South Carolina, were reported. The survey for those states has been completed, and as was the case in most other sections, the 1959 counts are higher than for 1958. The average number of live weevils found per acre of woods trash for the various areas of North and South Carolina were as follows: South central section of South Carolina (Orangeburg, Bamberg, and Dorchester Counties) 1,318 in 1959 compared with 995 in 1958; Coastal Plains section (Florence, Darlington and Marlboro Counties, South Carolina, and Scotland County, North Carolina) 5,082 in 1959 and 4,625 in 1958; Piedmont section (Anderson, Greenville, Spartanburg Counties, South Carolina and Mecklenburg, Cleveland, and Union Counties, North Carolina) 4,383 in 1959 and 2,635 in 1958; and the north central section of North Carolina (Nash, Wilson, Franklin and Edgecomb Counties) 834 in 1959 and 968 in 1958.★★

Why you should take a close look at LION E-2*

You don't have to look this close to see the advantages of selling Lion E-2 Ammonium Nitrate. The first thing you'll notice is that Lion gives you a definite storage advantage because of its super-density. An 80-lb. bag of Lion E-2 is 20 to 25% smaller than an 80-lb. bag of any other brand. Thus, the storage space you save with Lion E-2 can be used for 20 to 25% larger inventories to make more profit.

You feel the second advantage when you pick up a bag of Lion E-2. The bags are coated with Syton®, a special Monsanto antislip agent that lets you and your customers get a better grip for faster, safer handling.

Lion E-2 gives your customers another big advantage, too. Because Lion E-2 is super-dense, farmers can load more in their spreaders . . . actually eliminate one out of every five refill stops! And, Lion E-2 is guaranteed at least 33.5% vital nitrogen for maximum yields.

If you want the "lion's share" of ammonium nitrate sales in your area, take a close look at Lion E-2. You'll like what you see! Want more information? Just roar! LION E-2, Monsanto Chemical Company, St. Louis 66, Mo. LION: Reg. T. M.; *E-2: T. M. Monsanto Chemical Co.

Monsanto

LION E-2 is the only ammonium nitrate on the market that can save 20 to 25% of your valuable storage space. Because each Lion E-2 prill contains less useless air, you can stack *five* 80-lb. bags of Lion E-2 in the same space previously taken up by just *four* 80-lb. bags of any other brand. (Lion E-2 is a good deal for your customers, too. Because of E-2's super-density, farmers can eliminate one out of every five refill stops.)

LISTENING POST

By Paul Miller

Gibberellin and Fungicides Tested For Control of Bean Rot

ROBERT L. Rackham and John R. Vaughn*, of the Wyoming Agricultural Experiment Station, write that root rot of beans gives a great deal of trouble to growers in Wyoming. The fungus *Fusarium solani* f. *phaseoli* is the organism most commonly associated with root rot in this state. Despite the substantial amount of information that has been accumulated about the disease, there still is need for more effective control measures, according to Rackham and Vaughn. They report results of greenhouse experiments in which they tested various fungicides separately, and in combination with gibberellin, for possible usefulness in controlling root rot.

Gibberellin was included in experiments by Rackham and Vaughn because other workers had suggested that the early emergence and rapid growth induced by it might help the young plants to outgrow susceptibility to disease and insect attack sooner than they would otherwise be able to do.

Fusarium solani f. *phaseoli* served as the test pathogen and the Great Northern variety of bean as the host plant for these experiments. Treatments were replicated three times. Inoculated and uninoculated (sterile) untreated checks were included. Two highly pathogenic isolates of the *Fusarium* were combined in an aqueous spore suspension used for inoculating a steam-sterilized sand and soil mixture in 6-inch pots. The inoculum was thoroughly washed into the soil by watering from the top and the pots were let stand for 3 days to allow growth of the fungus in the inoculated soil. Whether the soil was then chemically treated or not before seeds were planted depended on the particular experiment.

Then bean seeds were planted in each pot. After germination the plants were trimmed to five per pot to give a uniform basis for the root-rot ratings, which were made after 6 to 9 weeks. Ratings were on a scale ranging from 0, roots healthy, to 4, roots completely rotted.

Fungicide Screening Trials. Table 1 lists the fungicides and concentrations tested and gives the results of this experiment. None of the fungicides used alone controlled root rot. Lower disease ratings were obtained in pots treated with Pittsburgh C-272, chloropicrin, Orthocide 75, or Phytoactin, than in the inoculated check pots, — but the differences were not statistically significant. Rackham and Vaughn considered that the lack of significance might be due to considerable variation between replications and to the relatively low disease rating of the inoculated check (1.9), which did not provide sufficient range for good rating differences on the scale of 0 to 4.

Gibberellin - Fungicide Screening Trials.—Table 2 shows the different methods of using the gibberellin fungicide combinations. Some of the treatments produced significant or highly significant reductions in amount of root rot as compared with the inoculated checks. These included Vapam-4S, with gibberellin applied as both spray and seed treatment; urea-formaldehyde, with gibberellin applied as a spray; and Ortho-

(*Continued on Page* 113)

Table 1. Effect of seven chemicals at three concentrations on severity of bean root rot[a].

Chemical	Rate of concentration per pot	Average disease ratings[b]
Griseofulvin-I	1000 ppm	1.6
	100 ppm	1.8
	20 ppm	1.3
Oligomycin	2000 ppm	.8
	500 ppm	1.1
	50 ppm	1.2
Chloropicrin	5.0 ml	1.0
	1.0 ml	.6
	0.5 ml	.4
Orthocide 75	1000 mg	.7
	300 mg	.9
	60 mg	1.6
Pittsburgh C-272	2000 ppm	.5
	500 ppm	.8
	50 ppm	1.0
Phytostreptin	1000 ppm	1.3
	100 ppm	1.7
	20 ppm	1.1
Phytoactin	1000 ppm	.9
	100 ppm	1.2
	20 ppm	1.4
Sterile Check		.7
Inoculated Check		1.9

NOTE: In the analysis of variance, treatments were not significantly different at the 5 per cent level.

[a] Chemicals were applied to the soil in 100 ml of water per pot.

[b] Ratings based on a 0 to 4 scale.

---

* Robert L. Rackham and John R. Vaughn, "The effects of gibberellin and fungicides on bean root rot," *Plant Disease Reporter*, vol. 43, No. 9, pages 1023-1026, Sept. 15, 1959.

BAG DAMAGE ENDS... *when you use multiwalls made of* CLUPAK* *extensible paper!*

NEW, TOUGHER KRAFT SOLVES BREAKAGE PROBLEMS

New CLUPAK extensible paper offers multiwall buyers a happy choice . . . Because CLUPAK extensible paper has a patented, built-in stretch and "give," it simply absorbs most shocks and strains that rip, split or tear conventional kraft. By specifying CLUPAK in your kraft bags, you solve your breakage problems once and for all. Multiwalls of CLUPAK fill faster, palletize better and handle easier. For special handling problems, CLUPAK can be supplied with a rough outer-sheet to provide far better anti-slide protection for your product.

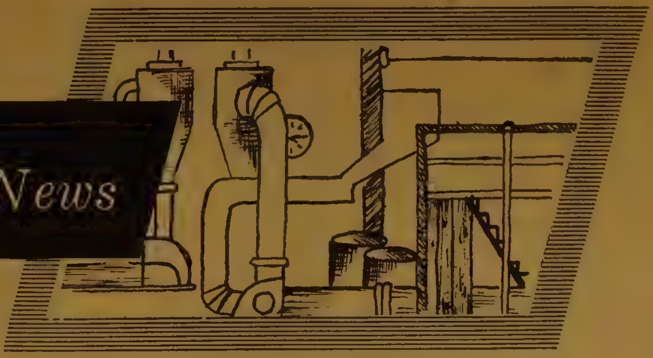
Millions of these new multiwalls have proved the advantage of this tougher, stronger paper. Plan a trial shipment of multiwalls, made of CLUPAK, as part of your next bag order. See the difference for yourself. Your customers are sure to like the extra service of a better, more dependable bag . . . and so will you.

FREIGHT SHIPPING BAG
MEETING REQUIREMENTS OF RULE 40
UNIFORM FREIGHT CLASSIFICATION

EXTENSIBLE
CLUPAK®
PAPER

*Clupak, Inc's. trademark for extensible paper manufactured under its authority and specifications. Clupak, Inc., 530 Fifth Avenue, New York 36, N. Y.

Fertilizer Views and News



Preneutralization

The preneutralization panel which stimulated so much discussion and participation at last November's Fertilizer Industry Round Table* apparently convinced a number of fertilizer producers to investigate the merits of the operation. We understand that, after studying the idea, at least three plant superintendents are installing pre neutralization equipment,—and that the subject is due for more discussion at the 1960 Fertilizer Industry Round Table.

AC

New Conditioner

The caking problem is unfortunately too common in the fertilizer industry,—as evidenced by the continued study of this situation. Petrochemicals have not been received too favorably, since their poor performance some ten years ago. One Baltimore fertilizer producer can now look with amusement at a plant full of suds, resulting from the addition of surfactant to reduce caking. At the time, however,—it wasn't funny.

This same plant man, however, reports that a new conditioner, Petro Ag (a surfactant), is quite promising. He has tried it in his plant,—and feels it's worth further trial. Petro Ag, we understand, can be used in conventional dry mixes or with high analysis granulations.

AC

Fertilizer Specialization

The preliminary fertilizer consumption figures (page 30-32 this issue) are very tangible evidence of the success of NPFI's program to increase the fertilizer market. One phase of their approach to "making a bigger pie," is teaching fertilizer salesmen how to sell fertilizer,—to know the product and to know the customer. Continuing their educational program, NPFI recently sponsored the Northeast Fertilizer Workshop (see story this issue, on page 45), which is just one of several regional meetings for fertilizer salesmen. Last year, International Minerals and Chemicals Corp., also held a series of fertilizer training courses—14 in all—throughout the country. All these projects help build a bigger fertilizer market.

AC

Doctrine of Inefficiency

Alarm about government expenditures for agriculture and about falling farm income has resulted in the advocacy of a great variety of alleged "solutions to the farm problem." One of the strangest of these, is what is described by the National Plant Food Institute as the "Doctrine of Inefficiency,"—limit use of chemical aids to agriculture, so we won't have such big crop surpluses to dispose of.

NPFI's vice president, Raoul Allstetter, recently addressed the Iowa Fertilizer Industry Representative's Conference in Ames, and commented on this novel solution, which would involve closing down fertilizer and pesticide factories,—"a sort of Soil Bank for the farm chemical industry." He pointed out that even some scientists and college administrators have been contaminted by the virus of this doctrine, — and consequently have been reluctant to push vigorously practices which increase efficiency on the farm.

Mr. Allstetter offered the following conclusions in his address to the Iowa group, citing several flaws in the idea that we can solve our farm problem by stopping progress in the efficient use of agricultural chemicals:

1. The "Doctrine of Inefficiency," is erroneous.
2. It will not work on a national basis, and even less so on a state or local basis.
3. The "Doctrine of Inefficiency" is a threat to Colleges of Agriculture.
4. Opposition to increasing farm efficiency is akin to featherbedding in the labor movement. If our farming efficiency should decline in relation to needs to the point that we could not supply our needs in adverse years, we would be in a dangerous situation.

AC

Design Engineers

Experience has demonstrated that the most successful design engineers in the fertilizer industry, are those who specialize in fertilizer plants . . . who have studied fertilizer production problems, and have made numerous installations. Chemical design engineers who have the mistaken idea that they can put in a bid on designing a fertilizer plant, just because it can be classified as a chemical plant,—can (and have) made some very costly mistakes. Often, almost as much money is invested in ironing out some of the problems which develop in plants (built without previous industry experience) as is involved in the initial construction.

We grow good peanuts in North Carolina, and I give lots of the credit to Terraclor. I got some of the best peanuts I ever made where I used it for stem rot.

Here on Long Island, we're growing healthy cabbage now that we're using Terraclor in the transplant water.

We county agents have been running a lot of stem rot tests on Georgia tomatoes, and you could tell to the row where Terraclor was left out of the transplant water.

Like most Arizona cotton farmers I'm all for Terraclor. There's nothing like it for controlling damping-off.

Terraclor has really done the job on beans for root and stem rot. It's meant improved stands and increased yields all over California.

I'm a cotton pathologist. I can tell you that down here in Texas, soil fungicides return many times the investment.

Men who know are saying...

Terraclor®

SOIL FUNGICIDE

Gives protection, bigger yields, greater profits

Terraclor pays off on:

COTTON: 25-30% of total disease losses are caused by seedling diseases. Replanting costs $5-15.00 per acre, plus loss of pre-emergence herbicide previously used. Terraclor may increase yields and return the grower more than 15 times his investment through uniform stands of better grade cotton.

CABBAGE, CAULIFLOWER: Severe club root infection can take a field out of crucifer production entirely. Terraclor control has provided 3-5 ton per acre increases for a return of 10-30 times the investment. Terraclor also controls black root or wire stem.

PEANUTS: Faced with the threat of a 50-60% crop loss, growers can realize Terraclor-increased yields of as high as 350-500 lbs. per acre of clean peanuts – free from soil. This return is many times the cost of the chemical invested for control of stem and root rot (Southern blight).

BEANS: Root and stem rot losses run as high as 30-40%. Terraclor may increase yields by 200-300 lbs. per acre and return growers 10-15 times the cost of treatment. Terraclor also controls white mold.

TOMATOES, PEPPERS: Stem rot (Southern blight) can cut production 30-60%, depending on severity. Terraclor treatment can return 10-20 times the investment by increasing yields ⅓ to ½.

LETTUCE: Growers have lost 25-50% of their crop to leaf drop and bottom rot. Terraclor may increase yields by ½ for a profit far exceeding the chemical cost.

Also:

POTATOES	(Scab, Rhizoctonia)
WHEAT SEED	(Common Smut or Bunt)
GARLIC	(White Rot)
ALFALFA, CLOVER	(Crown Rot)

FORMULATORS — Get complete information on Terraclor for control of soil-borne diseases. Terraclor is available as 75% wettable powder, 2-lb. emulsifiable, and dust formulations. Call or write today.

OLIN MATHIESON CHEMICAL CORPORATION
INSECTICIDE PRODUCTS DEPARTMENT
Fresno, Calif. • Baltimore, Md. • Denver, Colo. • Dallas, Tex.
New York, N.Y. • East Point, Ga.

TERRACLOR® is a trademark

7402

NEWS about the TRADE

Elected IMC Vice President

John D. Ziegler, general manager of the Plant Food Division, International Minerals & Chemical Corp., Skokie, Ill., has been elected a vice president of the company. Also elected vice president at the same time was Joseph M. McGarry, director of public relations.

Mr. Ziegler, a 27-year employee at IMC, has been general manager of the plant food Division since 1956. He joined the company in 1933 as a salesman in Cincinnati.

•

First Intermountain Conf.

The Intermountain Meadow and Range Fertilization Conference—the first of its kind—will be held Feb. 19 and 20 at Colorado State University, Ft. Collins, Colo. The National Plant Food Institute is cosponsoring the conference with the Colorado Cattlemen's Association.

Among the topics to be discussed are: fertilization of meadows, mountain ranges, and ranches; and increased beef and forage production from fertilization.

•

NAC Review '59 Pesticide Sales

In a year end statement from the National Agricultural Chemicals Association, 1959 sales of basic pesticide chemicals at the manufacturers level are estimated at about $278 million, — a 5% increase over 1958. This figure is interpreted to represent a total sales volume of $550 to $600 million at the users level. NAC advises that "Widespread and spectacular insect and plant disease infestations were not prevalent during 1959, thus the sales gains can be attributed to a growing recognition of the economic benefits to be obtained by the proper and judicious use of pesticides in food and fiber crop production, forestry management, roadside and park maintenance, and in global public health programs."

•

AAI Elects Bauserman

Carl Bauserman, Southern Michigan Nitrogen Co., Richmond, Mich., was elected president of the Agricultural Ammonia Institute at the group's annual meeting in Dallas, Texas, Jan. 13-15.

Other officers for 1960 are: Cecil Squibb, Squibb-Taylor, Inc., Dallas, first vice president; A. J. Schlabach, Aldo Soil Service, Wauseon, Ohio, second vice president; Robert Blobaum, Great Plains Service, Inc., Ashland, Neb., secretary; and David H. Bradford Jr., Mid-South Chemical Corp., Memphis, Tenn., treasurer.

•

Georgia Society Meeting

The 24th meeting of the Georgia Entomological Society will be held in the New Science Center, University of Georgia, Athens, on March 30 and 31.

•

Heads General Chemical Div.

Frank J. French has been named president of the General Chemical Division, Allied Chemical Corp., New York. He succeeds Irb H. Fooshee, who was named manufacturing vice president for Allied last summer. Mr. French has been with the General Chemical Division since 1925. He was named vice president in 1958 and an executive vice president in 1959.

Gidney Joins Potash Co.

Dean R. Gidney has just been named vice-president in charge of sales for Potash Company of America. He was to assume his new duties on February 1. Mr. Gidney has spent his entire business career in the potash industry except for a period during World War II when he served with the U. S. Navy. He was with U. S. Potash Co. for many years, first as a salesman, later as vice-president in charge of sales and for the past three years as general mangaer of the Potash Division. He is a well known figure in the fertilizer supply trade and has many friends throughout the industry.

•

Md. Pest Control Conferences

Information on the control of insects, diseases, nematodes, and weeds will be discussed at the annual Maryland agricultural pesticides conferences. The first conference will be held Feb. 16 at the Francis Scott Key Hotel in Frederick, Md. The other meeting will be held Feb. 16 in the Elk's Home, Salisbury, Md.

Dr. O. L. Weaver, University of Maryland plant pathologist, is chairman of the conference.

WACA Spring Meeting Mar. 22

The spring meeting of the Western Agricultural Chemicals Association at Miramar Hotel, Santa Barbara, Calif., March 22 and 23, will feature as speakers: Dr. Daniel G. Aldrich, dean of agriculture, University of California, "Development and Use of California Land for Agriculture"; S. H. McAllister, general manager, Agricultural Chemicals Division, Shell Chemical Corp., "Research and Development of Commercial Pesticides"; and William R. Dixon, general sales manager, Dow Chemical Co., "Marketing".

F. M. Ashton, associate professor of agricultural botany, U. of California, Davis, will discuss absorption, movement, and action of 2,4-D. James R. Dutton, regional supervisor, Plant Pest Control Division, ARS, USDA, will report on aerial spray programs and there will be an industry panel on marketing aspects of the agricultural chemicals business. Panel members and their topics will be: C. E. Cody, California Spray-Chemical Corp., "Marketing Trends in the West"; Dr. Leon C. Glover, Shell Chemical Corp., "Granular Pesticides"; and A. B. Horner, The Best Fertilizers Co., "Pesticide-Fertilizer Mixes".

Bradley Vice President

Peter S. Bradley has been appointed executive vice president of the Bradley Pulverizer Co., Allentown, Pa. He had been general manager of the firm.

Texas Conference Feb. 9-11

The 7th annual Texas Agricultural Chemcials Conference will be held at Texas Technological College, Lubbock, Feb. 9 to 11.

Among the speakers will be: Dr. Wayne McCully, Agricultural experiment station, College Station, Texas, "The Use of Chemicals in the Production of Pastures"; S. C. Smith, Smith Co., Uvalde, Texas, "Dealer Problems in Handling Agricultural Chemicals"; and W. B. Andrews, Mississippi Chemical Corp., Yazoo City, Miss., "What Should I As a Farmer Know About Using Anhydrous Ammonia?"

In all, more than 20 talks are scheduled to develop the meeting's theme; "The Place of Chemicals in West Texas Agriculture."

Potash Company President

John W. Hall, who was named president of the Potash Company of America in December, (See January, 1960 **Agricultural Chemicals**, page 71) has been with the company for ten years, starting as Northern Regional sales manager.

Later he was appointed general sales manager and for the past four years he has been vice president in charge of sales, a member of the board of directors, and a member of the executive committee of the board. His new assignment has taken him to the company's central headquarters in Denver, Colo.

Mr. Hall is a director of the American Potash Institute and is a member of the executive committee of the National Plant Food Institute.

Heyden Names Klein

David X. Klein, technical director of Heyden Chemical Division, Heyden Newport Chemical Corp., New York, has been appointed a divisional vice president.

Alabama Conference Feb. 17

The thirteenth Alabama Pest Control Conference will be held Feb. 17 and 18 in Duncan Hall at Auburn University, Auburn, Ala.

Dr. G. J. Hauessler, USDA, Beltsville, Md., will talk on the need for pesticides in modern America. The outlook for 1960 will be discussed by Foy Helms, Auburn.

Other features of the meeting include: an industry panel on new insecticides; a discusssion of application equipment; and reports on pest and weed control in Ala.

Harold McCormick Retires

Harold S. McCormick, executive vice president of H. J. Baker & Bro., Inc., New York, has announced his retirement after 49 years with the company.

R. J. Rawls Joins Planters

Planters Chemical Corp., Norfolk, Va., announced January 27th, that R. J. Lewis has joined their company as salesman.

Mr. Rawls will be in charge of sales of Planters pesticides in the Washington, D. C. and North Carolina area.

Planters Chemical, in the pesticide business for over 52 years, operates plants in Norfolk, Va.; and Fayetteville, N. C.

Pesticide Research Shift

The emphasis on research in the pesticide field is shifting to such basic subjects as the mode of action of pesticides, resistance factors, insect behavior, diapause and hibernation, biological control, and use of sterile insects, M. P. Jones, president of the Entomological Society of America, told the members of the Southeastern Branch, ESA, at the group's annual meeting in Savannah, Ga., Jan. 25 to 27.

Dr. Jones said that basic research is aimed primarily at finding ways to eradicate imported insect pests by the use of chemicals as well as natural enemies. The weak points in the insect are being turned up, he said, so that his soft side can be attacked with eradication as the objective in many instances.

Various techniques are under investigation aimed at holding residues of insecticidal chemicals at levels safe to humans and other forms of life, Dr. Jones added. One method, he continued, is the use of attractants, with lower concentration of toxicants in bait form. We have only scratched the surface, he said, in the use of repellents as well as a number of other measures for insect control.

Nitrogen Div. Names Two

G. C. Matthiesen has been appointed midwest sales manager, direct application materials for Allied Chemical Corp.'s Nitrogen Division, New York.

John L. Thieman was named regional product supervisor, direct application materials.

TOUGH MATERIAL SPECIALIST—

The Model 12B Michigan

CHROME and CARBORUNDUM ORE are unloaded fast by this 16 cu ft Model 12B. Owner: New York Central RR. Location: Jersey City.

Like all Michigans, the 12B has efficient all-Clark power train, including power-shift transmission, torque converter, planetary-wheel drive axle.

BROKEN GLASS reclaiming is the prime use of this Michigan Model 12B owned by Fairmount Glass Works, Indianapolis, Indiana.

BROKEN TILE, 400 tons per 8 hour day—that's the output of the two 12B's owned by Oconee Clay Products Co., Milledgeville, Georgia.

DOLOMITE, charged directly into red-hot open hearths, is this Michigan's tough, but successful assignment in this Illinois steel plant.

COKE, used by American Brake Shoe Co, Buffalo, is dumped into hopper. Note cramped quarters easily negotiated by the Model 12B.

FERTILIZER, tight-packed and hard to dig, yields to powerful Virginia-owned Model 12B. Note the heaped bucket, a "trademark" of all Michigans.

Your "tough jobs," too, are made to order for Michigan Tractor Shovels. Model 12B capacity is 3,000 lbs, buckets are available to carry from 6 to 27 cubic feet. Write for details.

Michigan is a registered trademark of

CLARK EQUIPMENT COMPANY
Construction Machinery Division

CLARK® EQUIPMENT

2463 Pipestone Road
Benton Harbor 34, Michigan
In Canada:
Canadian Clark, Ltd.
St. Thomas, Ontario

Ashcraft-Wilkinson Elects

Robert E. Ashcraft has been elected executive vice president of Ashcraft-Wilkinson Co., Atlanta. He has served as vice president of the firm since 1949.

Mr. Ashcraft joined the company in 1929 as a salesman. He subsequently served as branch manager of the Wilmington, N.C., and Norfolk, Va., offices, returning to Atlanta in 1955 as regional sales manager. The company was founded in 1912 by Mr. Ashcraft's uncle, the late Lee Ashcraft, and Mell R. Wilkinson.

•

Farmers Ask Advance Warning

Homer L. Brinkley, executive vice president of the National Council of Farmer Cooperatives, has asked Secretary of Health, Education and Welfare Arthur S. Flemming to let them know if there are any farm commodities "now on your list for investigation" and how far along the studies are.

The farm group wants to know "what we, as farmers, might reasonably be expected to do in order to correct any situation which is suspect so that we may protect the consumers of those products as well as ourselves."

•

German Food Additives Law

A new West German food law, — the Lebensmittelrecht — went into effect early in 1960, and is the cause of some concern to U. S. citrus exporters and agricultural chemical makers. Under the new revised law, no chemical substances may be added to, or applied to the surface of foodstuffs, unless authorized. Burden of proof that goods are safe for consumption is on the processor or exporter to Germany. Under the old law, anything not specifically prohibited was allowed, — and the burden of proving the additives harmful rested with the German government.

So far, only 16 chemicals have been approved under the German law, compared with about 182 permitted in the United States. The list is severely restricted, largely because the German food industries are not as technologically advanced as are the U. S. counterparts. When one additive will do a job, the Germans are against approving numerous comparable compounds.

New regulations on citrus fruits are generally in line with U. S. regulations. The only additives being allowed as preservatives for canned food are sorbic acid, benzoic acid, benzoic acid ester and formic acid. Some emulsifiers have been given approval, but sequestering agents, anticaking agents and phenolic antioxidants are not permitted.

•

Voigt Heads Stedman Co.

Howard F. Voigt has been appointed president of Stedman Foundry & Machine Co., Inc., Aurora, Ind. Mr. Voigt joined Stedman, a subsidiary of United Engineering and Foundry Co., Pittsburgh, Pa., after more than 20 years with the parent organization.

Chemical Analysis System

A new dynamic chemical analysis system for determining inhibition of acetylcholinesterase by certain anticholinesterase insecticides was introduced recently by Technicon Controls, Inc., Chauncey, N. Y. The new development in automatic wet chemistry instrumentation was announced at the meeting of the Association of Official Agricultural Chemists in the Shoreham Hotel, Washington, D. C., October 12 through 14.

Developed to determine residual potency of such highly toxic phosphate ester insecticides as parathion and malathion, the new cholinesterase bio-assay employs the Technicon AutoAnalyzer, a system of continuous, automatic chemical analysis that eliminates conventional analytical techniques.

1959 Fertilizer Production Reached Record Levels

FERTILIZER production and sales attained new heights in 1959, approximately ten per cent ahead of 1958, according to a report released by the Business and Defense Services Administration, U.S. Department of Commerce.

The decline in farm income during 1959 is expected to have some adverse effect on fertilizer purchases in 1960, the report went on to say, but this income decline was not expected to have as much effect as it had during comparable previous years. The trend today in agriculture, as farming costs rise, is to make use of more fertilizer so as to maximize returns on the investment in the new crop. Little change in imports and exports of fertilizer is seen for 1960 and the dollar values of incoming and outgoing shipments are expected to be in approximate balance.

The totals of increased production and consumption during 1959 are expected to be greater than the annual increments of several preceding years. Gross tonnage in 1959 is expected to have exceeded 24 million tons. Approximately 70 per cent of the annual consumption of fertilizers occurs in the first half of the year and movement from producer to consumer of this proportion is concentrated largely in the three spring months, March, April, and May.

The magnitude of the demand last spring caught some suppliers by surprise, the report said, and difficulties were experienced at times in transportation and in meeting customers' delivery demands. Producers' inventories of most fertilizer materials were reduced to lower levels than usual by the end of the season. "Some replenishment of stocks occurred during the summer months, but demands for fall application also were favorable for that season, so it is difficult to ascertain whether end-of-the year inventories attained the level of those of 1958.

Activity in the fertilizer industry is expected to continue high in 1960, and consumption is anticipated at about the same level as in 1959. A few spot shortages in phosphoric acid and ammonium sulfate may occur during the spring peak, but fertilizer supplies, in general, should be adequate in 1960.

FDA Rescinds Tolerance on Heptachlor

THE U. S. Food and Drug Administration acted, January 19th to establish a zero tolerance for heptachlor and heptachlor epoxide residues on harvested crops. A previous FDA regulation had permitted residues of 0.1 part per million of heptachlor on 34 raw agricultural commodities, including fruits, vegetables, grain and forage crops. FDA indicated, however, on October 27, 1959, that it was preparing to rescind the tolerance. This action was taken because, according to F.D.A., new scientific data showed that in addition to residues of heptachlor, treated crops also were found to carry a break-down product of heptachlor — heptachlor epoxide. "Data are not yet available," it was indicated by F.D.A., "to show how much of the epoxide may be present under varying conditions, and the toxicity of the epoxide has not been fully evaluated."

Commissioner George P. Larrick of F.D.A. observed that the action taken was in line with "longstanding policy not to allow residues of pesticides on crops unless complete evidence is available to establish the amount of the residue which will result . . . and that this amount will be safe to the consumer of the crops." Nevertheless, he advised, "the situation does not call for any action against crops already treated in accordance with label directions registered with the U. S. Department of Agriculture and containing heptachlor residues within the original legal tolerance of 0.1 part per million."

Velsicol officials have pointed out that there are many uses of heptachlor which will remain completely unaffected by the F.D.A. action in rescinding the previously permitted tolerance. Many uses of heptachlor result in no residues in food, and thus will not be affected by the order. Also the F.D.A. control applies only to raw agricultural commodities moving in interstate commerce. In addition, there are numerous non-food uses for heptachlor — in the protection of turf, nursery stocks, ornamentals, etc. and in control of termites, fire ants, grasshoppers, etc—which will obviously not be affected by the F.D.A. action in restricting usage of heptachlor on food products.

Heptachlor was one of the first pesticides to be granted a tolerance under the provisions of the Pesticide Residue Amendment to Public Law 518. It has been effectively used to protect grain, forage, fruits and vegetables from insect damage for many years. It has been widely used in the U. S. Dept. of Agriculture's program to eradicate the fire ant throughout the south, in the grasshopper programs in the Western and Great Plains states, and in control programs against the Japanese beetle and the white fringed beetle. In spite of this widespread use, Food and Drug indicate in a statement accompanying their latest action that "no residues of heptachlor itself have been found in meat or milk," and in recent tests of milk samples, no residues of heptachlor epoxide were reported.

A spokesman for Velsicol Chemical Corp. emphasizes that even the Food and Drug Administration must recognize that no appreciable hazard exists in connection with use of the product in the manner in which it has been employed, for F.D.A.'s own statement in announcing its latest action indicated that there is no reason "for any action against crops already treated in accordance with label directions."

The insecticide industry generally is much concerned over the situation that has arisen. It is pointed out that this is the first time that a tolerance has been set, or in this case refused, on a conversion product. Attorneys for all pesticide producers are studying the matter with understandable interest and concern.

Formulators and dealers with stocks of pesticides containing heptachlor are also seriously affected. Food and Drug made its recent order immediately effective, leaving no opportunity for orderly disposal of existing stocks of pesticides containing heptachlor, although these materials had been purchased on the recommendation of U.S.D.A. and State Experiment Stations, and with the full advance knowledge of F.D.A. In previous withdrawals of other products, it is pointed out, ample time has been given for formulators, dealers and users to dispose of material in commercial channels. Many of those affected have appealed to Agriculture Secretary Benson, pointing out that setting an arbitrary immediate date is unrealistic, that cancellation of presently registered labels will only add to the confusion, and that prohibition against disposal of existing stocks of a material such as this which has been safely used over a period of eight years will create an unnecessary economic burden.

F.D.A., in its order announcing suspension of the previous tolerance, advised that the usual thirty days would be allowed for persons adversely affected by the ruling to file written objections and to request a public hearing. It seems highly probable that such a hearing will be requested.

◆

Rauh Elects Weldon

John J. Weldon has been elected chairman of the board of directors of E. Rauh & Sons Fertilizer Co., Indianapolis, Ind. In addition William F. Farley, Carl R. Sparks, and Robert C. Liebetrau were elected vice presidents of the company.

◆

Hodgson Joins Raymond Bag

R. H. Hodgson has joined the sales organization of the Raymond Bag Corp., Middletown, Ohio. He will represent Raymond in Georgia and surrounding areas from headquarters in Atlanta.

Nitrogen Division Shifts

The Nitrogen Division, Allied Chemical Corp., New York, has appointed Earl McNew as supervisor, sales development, and E. L. Copp as district supervisor, Indiana district.

Mr. McNew joined the company in 1953. Mr. Copp joined in 1955.

•

Pesticide Symposium Feb. 22

A symposium on pesticides will be presented Feb. 22 as a feature of the 42nd National Meeting of the American Institute of Chemical Engineers at the Hotel Biltmore in Atlanta, Ga.

Among the scheduled speakers, and their topics, are: J. V. Vernon, Food Machinery & Chemical Corp., New York, "The Pesticide Business"; J. G. Plowden, Geigy Agricultural Chemicals, Ardsley, N. Y., "History of DDT"; and H. R. Moody, Rohm & Haas Co., Philadelphia, "The Technology of Pesticide Manufacture."

Also on the program are: W. R. Bradley, American Cyanamid Co., New York, "Industrial Hygiene"; S. H. McAllister, Shell Chemical Corp., New York, "The Formulation of Pesticides"; and L. J. Polite, Jr., Dixon Chemical & Research, Inc., Bloomfield, N. J., "Distribution."

D. J. Porter, Diamond Alkali Co., Painesville, Ohio, is chairman of the symposium.

•

Pacific Branch To Meet

The Pacific branch of the Entomological Society of America will meet June 28 to 30 in the Davenport hotel, Spokane, Wash. Dr. Hugh Manis, chairman, department of entomology, University of Idaho, is branch chairman. With some 1000 members, it is the largest unit of ESA.

•

Carbide Appoints Back

Dr. R. C. Back has been appointed manager, technical development, Crag Agricultural Chemicals, by Union Carbide Chemicals Co., Division of Union Carbide Corp. He joined Carbide in 1955 as entomologist for the agricultural chemicals development group.

•

Pennsalt Representative

Robert S. Toth has been appointed sales representative, agricultural chemicals, by the Pennsalt of Washington Division, Pennsalt Chemicals Corp., Tacoma, Wash. His headquarters are at Pennsalt's new district office in Fresno, Calif.

Mr. Toth had been administrative assistant to the general manager, agricultural chemicals. He joined Pennsalt in 1951. The area serviced by the Fresno office is comprised of California, Arizona, Colorado, Utah, and Nevada.

•

Spencer Research Manager

William Threadgill has been named manager of agricultural market research by the Spencer Chemical Co., Kansas City, Mo. He joined Spencer in 1953.

•

Plan Fertilizer Conference

Dean Farnsworth, Phillips Petroleum Co., and Roy Lipps, US Steel Co., are arranging the 1960 Fertilizer Conference program scheduled for mid-July in Salt Lake City, Utah.

•

Potash Co. Production Switch

Potash Company of America is reported to be accelerating production of potash at its Carlsbad operations to balance the recent temporary shut-down of its new production facilities at Saskatchewan, Canada. Trouble was encountered several months ago from the seepage of water into the shaft at the company's Canadian mine. John W. Hall, president of the company, who recently completed a tour of inspection, advises that progress has been made in meeting the problem, but there is still additional work to be done before operations can be resumed. It is not yet known how long it will take before production will be back to normal at Saskatchewan.

Mr. Hall indicated that there will be no problem in meeting demand from the Carlsbad facilities for the 1960 growing season.

Cancel Packer Contract

The Chattanooga Boiler and Tank Co., Chattanooga, Tenn., has cancelled its contract with the Chase Bag Co. which gave Chase the exclusive sales rights to Southland Packers manufactured by the Chattanooga Boiler and Tank Co.

•

Kolker Building Chlorine Plant

Kolker Chemical Corp., Newark, N. J., is building a chlorine and caustic soda plant at its Doremus Ave. location which will go into operation later this year. For the time being, at least, the Kolker organization will operate the plant as a captive operation, using all the output itself. Output of the new facilities will be employed by Kolker in the manufacture of chlorinated solvents and in other organic chemicals planned for future production.

Kolker recently started the manufacture of benzyl benzoate and has sold a substantial quantity to the Army Quartermaster Corps for use in treating clothes to render them insect repellent.

•

Stedman Names Krueger

Harold R. Krueger has been appointed to the newly-created position of assistant sales manager of the machinery division of Stedman Foundry & Machine Co., Aurora, Ind. He had been a sales representative for Stedman for the past five years.

•

Fertilizer Sales Manager

Thomas J. White has been appointed fertilizer sales manager for Bradley & Baker. Formerly St. Louis area sales manager, Mr. White now is located in the company's New York office. He is replaced at St. Louis by Robert L. Borg.

•

Plant Joins Geigy Sales

John B. Plant has joined the western sales staff of Geigy Agricultural Chemicals, Division of Geigy Chemical Corp., Ardsley, N. Y. His territory is Utah and southern Idaho.

KENNEDY for grinding & conveying phosphates

KENNEDY Air Swept Grinding and Pneumatic Conveying Systems are important components of this, the first, triple super-phosphate plant in Mexico. Designed and equipped by Dorr-Oliver for Guanos y-Fertilizantes, its start-up is scheduled for 1960.

DORR-OLIVER

KENNEDY Ball Mills are noted for high tonnage and low cost processing of phosphate rock and other agricultural chemicals:

- Lowest maintenance cost—cannot be jammed or damaged by tramp iron or other foreign material
- No periodic shut downs for wearing part replacement
- Grinding media is replaced without interruption
- High capacity and product fineness remain constant—month after month
- Careful basic design and pressure lubrication assure high mechanical efficiency
- Reliable feed control and overall reliability provide high production with minimum manpower
- Higher capacity in single units—less space and structural steel per ton of capacity and lower initial investment.

KENNEDY AIR-FLOAT Conveyors provide trouble-free air-gravity conveying of dry materials:

- There are no moving parts—nothing to wear—nothing to maintain
- Only small volumes of low pressure air are needed—uses less power
- Operates quietly—has high capacity—requires little headroom
- The conveyed materials are completely enclosed—there is no dust
- Permits flexible design—directional changes are simple
- Can be made from corrosion resistant alloys
- Eliminates lubrication, complicated gears, belts and chains, spare parts and down time for maintenance.

Consult KENNEDY for further details. Let us show you the many advantages KENNEDY equipment can offer you.

KENNEDY VAN SAUN

MANUFACTURING & ENGINEERING CORPORATION

405 PARK AVENUE, NEW YORK 22, N.Y. • FACTORY: DANVILLE, PA.

Primary & Secondary Gyratory Crushers • Jaw Crushers • Roll Crushers • Impact Breakers • Hammer Mills • Rod & Ball Mills • Kilns • Dryers • Screens • Mechanical & Pneumatic Conveyors • Complete Crushing, Lime, Cement & Carbon Paste Plants. KENNEDY Research & Testing Service.

Nitrogen Div. Sales Shifts

James L. Rainey Jr., (left) has been appointed supervisor, Midwest direct application sales for the Nitrogen Division of Allied Chemical Corp., New York. He had been district sales supervisor of the division's North Central sales district and is succeeded in that position by J. P. Mills (right).

Mr. Rainey joined the company in 1954 as a field sales representative for Nitrogen Division in Ohio. In his new position he is located at division headquarters in New York.

Mr. Mills has been a field technical service representative for Nitrogen Division in the North Central district. He joined the company in 1950.

•

Moths To Control Weeds

The cinnabar moth, *Tyria jacobaeae,* a natural enemy of the tansy ragwort weed in Europe and Great Britain, has been imported by the U.S. Department of Agriculture in an effort to control the weed in four West Coast areas.

It is hoped that the moth responds to the climate in the release areas and will emerge next spring at the time the tansy ragwort plants are starting to form flower buds.

•

Weed Worker Honored

Dr. E. A. Helgeson, botanist for the North Dakota Agricultural Experiment Station and head of the botany department at North Dakota Agricultural College, Fargo, was honored for his work in weed control at the recent annual meeting of the Joint Western Canadian and North Central Weed Control Conference held at Winnipeg, Manitoba.

Dr. Helgeson was presented with a life membership in the conference, of which he is a former president.

•

Fertilizer Section Meeting

The executive committee of the Fertilizer Section, Natl. Safety Council, planned to hold its midwinter meeting at the New Florida Hotel, Lakeland, Fla., on Feb. 4.

Marshall Petersen, new staff representative from the National Safety Council was expected to be present to report on action by the Safety Council on several projects forwarded to the Council by the executive committee.

•

Michigan Sales Manager

The Michigan Chemical Corp., Saint Louis, Mich., has appointed E. Russell Leach as sales manager and Max R. Sias as manager, sales administration.

Mr. Leach previously was product manager of industrial and pharmaceutical chemicals for Michigan.

•

Joins Rutgers Staff

Dr. William R. Jenkins has been appointed associate research specialist in entomology for Rutgers University's Agricultural Experiment Station, filling a vacancy caused by the resignation of Dr. Martin T. Hutchinson. He had been with the University of Maryland.

Named District Manager

Dr. Howard E. Kremers has been appointed district manager of market development for the American Potash & Chemical Corp. He had been manager of market development for the company's Lindsay Division. His headquarters are in the company's eastern general sales office in New York.

•

Evansville Operations Sold

The J. A. McCarty Seed Co. has sold its Evansville, Ind., seed, feed, agricultural chemical, farm supply, and wholesale operations to Seedkem, Inc., a newly organized corporation.

George K. Black, who had been with McCarty for 14 years, is president and general manager of the new company and Richard W. Klipsch is secretary-treasurer and sales manager. W. Vernal Klipsch, Richard's father, is vice president. The younger Klipsch had been with the sales department of Hahn, Inc., Evansville manufacturer of farm machinery.

Century Plans Further Expansion Into A Variety of Products

A CHEMICAL complex, Century Chemical Corp., New York, announced further expansion plans at a press conference held in New York City last month. "Our long-range plans are based on the production of chemical intermediates, and we organized our corporate structure to permit flexible expansion into a wide variety of products," stated Theodore S. Hodgins, president.

The company was formed in 1958 with a capitalization of $350,000. Since its formation, Century has taken over Wilson Organic Chemicals, Sayreville, N.J.; Chemo Puro Manufacturing Corp., Oil & Chemical Terminals, Inc., and the Asphalt Division of Oil & Chemical Products, Inc., all of Newark, N.J.; plus Chemo Puro AG, a European sales organization with headquarters in Zurich, Switzerland. Operations of the newly-acquired companies have been integrated with those of the parent company.

Chemo Puro produces fine chemicals and intermediates for the drug, pharmaceutical and cosmetic industries, as well as animal feed supplements and food additives; Wilson Organic Chemicals produces organic dyes, pigments and aromatic fine chemicals for the drug, pharmaceutical, dyestuffs, rubber and fungicide industries.

Outlining plans for the future, Mr. Hodgins indicates, "Our broad expansion goals are in the fields of nitration, chlorination and oxidation . . . which means all fields of the chemical industry. We hope to make available an entire, broad line of chemical intermediate chemicals. Some will be captive, others sold to chemical manufacturers. We will not attempt to compete with the large chemical producers, but plan to supplement their own output wherever possible."

Mr. Hodgins was formerly vice president and director of Reichhold Chemicals (Canada).

American Cyanamid to Build Agricultural Center at Princeton

The American Cyanamid Co., New York, plans to establish an agricultural center near Princeton, N.J., that will combine facilities for laboratory research and development work with practical field-testing conditions similar to those found on a private farm. The center will bring together research groups formerly located at Stamford, Conn., and Pearl River, N. Y.

Approximately 500 acres of the center's 640-acre farm site will be planted in agronomic crops—legumes, grasses, and winter wheat—with approximately 100 acres left in woodland and 15 acres devoted to animal test activities.

The center will be operated by Cyanamid's Agricultural Division, with Dr. J. T. Thurston heading the administrative staff as manager of research and development. The center is scheduled to be completed in 1961.

Expand Field Sales Force

The Union Carbide Chemicals Co., Division of Union Carbide Corp., New York, has transferred two Crag agricultural chemicals sales representatives from company headquarters in New York to marketing areas in the field.

Eugene G. Ward has been transferred to Jackson, Miss., and T. F. Fricke is assigned to headquarters at Madison, Wisc.

Shade Tree Conference

The 15th annual meeting of the Midwestern Chapter of the National Shade Tree Conference will be held Feb. 10 to 12 in the Sheraton-Fontenelle Hotel, Omaha, Neb.

The program will feature discussions of diseases and insects that currently are affecting shade trees in the midwest. Equipment and supplies used in the care of trees and shrubs will be on display throughout the meeting.

ACS Elects Hazleton

Dr. Lloyd W. Hazleton, president of Hazleton Laboratories, Inc., Falls Church, W. Va., has been elected chairman of the American Chemical Society's division of agricultural and food chemistry. He succeeds Dr. Frank M. Strong of the University of Wisconsin.

Leonard S. Stoloff of the Seaplant Chemical Corp., New Bedford, Mass., was chosen chairman-elect of the ACS division, and Dr. Richard W. Thoma of E. R. Squibb & Sons, New Brunswick, N. J., was named secretary-treasurer.

Increased Crop Yields

A new method of using polyethylene film mulch to increase yields of major vegetable crops was described at the annual meeting of the American Vegetable Growers Association at Atlantic City, N.J., in December by Dr. E. M. Emmert, professor of horticulture, University of Kentucky.

Dr. Emmert reported on 1959 experiments utilizing a double layer of film. A bottom layer of black polyethylene, four feet wide, is laid down and lightly covered with loose soil. A thinner layer of clear polyethylene film of the same width is laid on top and is anchored by covering the sides with soil. In sixteen tests on six vegetables, Dr. Emmert reported that the double film produced markedly superior yields than does black polyethylene alone. He attributed this to earlier warming of the soil and a retention of soil heat after the sun has gone down.

Acquires Fertilizer Firm

The Summers Fertilizer Co., Baltimore, Md., has acquired the A. D. Graham & Co.'s mixed fertilizer and farm supply business at Somerset, Pa. The facilities at Somerset also will be used as the new home for Summers' Kapco Division.

The acquired business will be operated as the Graham Division of the Summers Fertilizer Co. Fleming Casebeer will continue as manager of the division.

President of Nopco

George R. Stier has been elected president of the Nopco Chemical Co., Newark, N. J. He succeeds Ralph Wechsler, who has become chairman of the board.

Monthly Chemical Index

Index Chemicus, a monthly index to 50,000 new chemicals reported each year, is being planned by Eugene Garfield Associates, Philadelphia. The inaugural issue is expected to appear early this year.

The index will contain listings of chemical names, structural diagrams, and molecular formulas plus bibliographical information including references to scientific literature in which new chemicals are reported.

Grace Planning Director

The Grace Chemical Division, W. R. Grace & Co., New York, has appointed Alfred F. Dugan as director of planning. He had been administrative director of the Polymer Chemical Division.

See New Use For MH

Dr. Ivan Stewart and Dr. C. D. Leonard at the Citrus Experiment Station, Lake Alfred, Fla., have reported that maleic hydrazide, sprayed on citrus trees, will induce complete dormancy and help avoid damage to the trees from cold weather.

The material can be applied before cold weather strikes or immediately after the trees are stripped of their leaves by cold. Defoliated trees have a tendency to shoot new growth as soon as warm weather returns, and are thus "sitting ducks" for later freezes the same season, the scientists explained. Treated trees, however, produce no new growth during the winter and escape with little injury from cold.

WANT ACTION ON YOUR CLAY ORDER?

does it seem to rock along in one spot
when it should rocket along to your plant?

To get your clay order out of the rut and into the groove . . . see a Magcobar sales-engineer. He'll take special care to assure that you get exactly what you want, where and when you want it.

CARRICLAY
6 to 8 VM
Granular and Pulverized

PULGITE
12 to 14 VM
Granular and Pulverized

ARROWHEAD
Granular Bentonite

For action, call the man from Magcobar.

MAGNET COVE BARIUM CORPORATION

Philadelphia 7, Pa. 702 Western Savings Fund Bldg.
Houston, Texas P. O. Box 6504

Magcobar
AGRICULTURAL AND
INDUSTRIAL PRODUCTS
ONE OF THE DRESSER INDUSTRIES
DI

usPp

TRIPLE
SUPERPHOSPHATE

RUN-OF-PILE, GRANULAR, COARSE

Products of controlled chemical and physical structure

For scheduling and requirements – Contact our

Sales Agents
BRADLEY & BAKER

U.S. PHOSPHORIC PRODUCTS
TAMPA, FLORIDA
Division
TENNESSEE CORPORATION

Urges Cattle Grub Research

Sen. Milton R. Young of North Dakota has asked the government to undertake a crash research program to find a new cattle grub pesticide that will not leave residues and will insure against charges of meat contamination by health authorities.

The Senator believes that the job can be accomplished for about $7 million—a small price to pay, he said, in comparison to the losses the industry would suffer if charges could be substantiated that the pesticides now in use are finding their way to the dinner table.

•

Witco Executive Changes

Three changes have been announced in the management of the Organic Chemicals Division of Witco Chemical Co., New York. Harold B. Seligman has been named vice president and general manager, Jerome Harrison is vice president and director of marketing, and Stanley D. Shaw is midwestern sales manager.

Mr. Seligman formerly was financial and administrative vice president of the company. Mr. Harrison had been vice president in charge of midwestern sales for the organic division, and Mr. Shaw had been Mr. Harrison's assistant.

•

Hoffmann Fills New Post

Robert W. Hoffmann has been named to the newly-created post of technical service representative at Vulcan Containers Inc., Bellwood, Ill.

Before joining Vulcan, Mr. Hoffmann had been with the Flint Ink Corp., Broadview, Ill.

•

Otto Haas Dies

Otto Haas, founder and honorary chairman of the board of Rohm & Haas Co., Philadelphia, died Jan. 2 at his home in Villanova, Pa. He was 87 years old.

At a special meeting of the board of directors, held on Dec. 31, just two days before his death, Mr. Haas had announced his retirement as the firm's chief executive.

At the meeting, Dr. Ralph Connor was elected chairman of the board. Dr. F. O. Haas was elected president of the company and chairman of the executive committee of the board, and John C. Haas was elected vice chairman of the board.

Mr. Haas founded the company in 1907 with Dr. Otto Rohm in Germany. Mr. Haas founded the American company in 1909 and Dr. Rohm remained in Germany as head of the German company.

St. Regis Marketing Manager

John T. Walton has been appointed manager of marketing services for the Bag Division of the St. Regis Paper Co., New York. He had been manager of domestic licensee relations.

In other appointments announced by the division, Donald R. Russell was named multiwall product manager and Alfred A. Roetzer has been named general manager of packaging services.

KOLKER
METHYL
BROMIDE

Now being produced at our modern plant in Newark, N.J., Kolker Methyl Bromide is the outstanding fumigant for the elimination of insect and rodent infestation of grain, tobacco plant beds, seeds, dried fruits, cereals, nursery stock and a wide variety of other products.

KOLKER METHYL BROMIDE

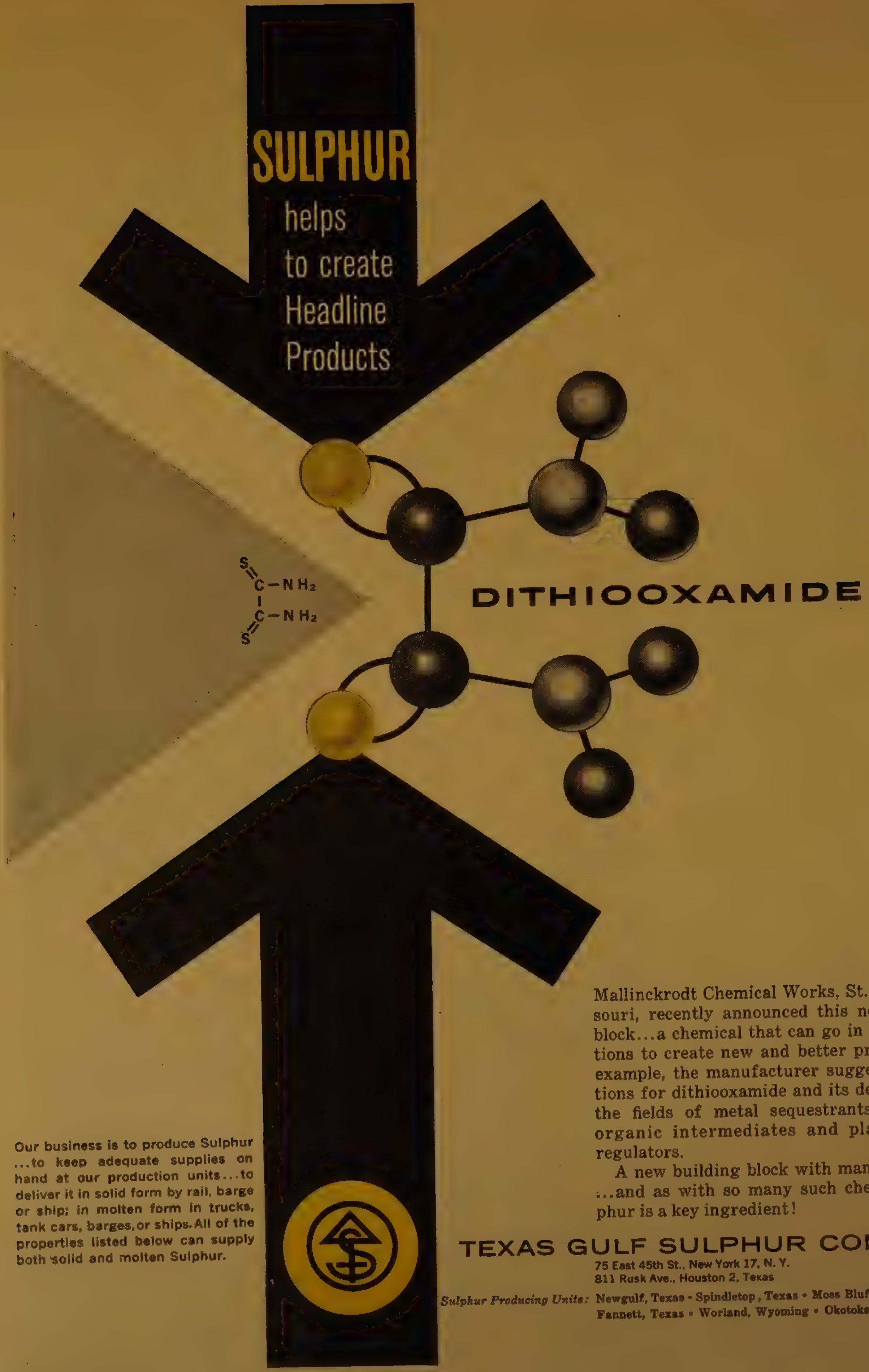
- Kills insects, mites and related pests in all stages of their development.
- Has a high degree of toxicity to a wide range of insects, rodents and other pests.
- Has rapid volatilization and a high rate of diffusion into stored grain, bales, packages and soil.
- Is non-explosive and non-flammable.
- Does not leave any residual odors, tastes or stains.
- Is economical to use.

Kolker Methyl Bromide is packaged in regular one-pound cans with 2% chloropicrin as warning agent, and 50, 150 and 450 pound cylinders of 100% methyl bromide.

Sale of Kolker Methyl Bromide will be handled by distributors throughout the country.

For further information on this highly effective fumigant, please call or write us today.

KOLKER CHEMICAL CORPORATION
600 Doremus Ave. · Newark 5, N. J. · MArket 2-4085



Mallinckrodt Chemical Works, St. Louis, Missouri, recently announced this new building block...a chemical that can go in many directions to create new and better products. For example, the manufacturer suggests applications for dithiooxamide and its derivatives in the fields of metal sequestrants, pigments, organic intermediates and plant growth regulators.

A new building block with many potentials ...and as with so many such chemicals, Sulphur is a key ingredient!

Our business is to produce Sulphur ...to keep adequate supplies on hand at our production units...to deliver it in solid form by rail, barge or ship; in molten form in trucks, tank cars, barges, or ships. All of the properties listed below can supply both solid and molten Sulphur.

TEXAS GULF SULPHUR COMPANY

75 East 45th St., New York 17, N. Y.
811 Rusk Ave., Houston 2, Texas

Sulphur Producing Units: Newgulf, Texas • Spindletop, Texas • Moss Bluff, Texas • Fannett, Texas • Worland, Wyoming • Okotoks, Alberta, Canada

Buys St. Regis Facilities

The Consolidated Paper Corp., Montreal, Canada, is purchasing from the St. Regis Paper Co., New York, all of its multiwall bag and packaging-system manufacturing facilities in Canada. The terms were reported to be $1.6 million in cash and 785,000 shares of Consolidated's stock.

Consolidated proposes to incorporate a new company, St. Regis-Consolidated Packaging Ltd., to carry on manufacturing operations in Vancouver, B. C., Dryden, Ont., and St. Lambert and Cap de la Madeleine, Que.

IMC Appoints Roe

Lawrence A. Roe, formerly director of development in the research, engineering and development division of International Minerals & Chemical Corp., Skokie, Ill., has been appointed staff director, minerals processing, a new position.

Allied Changes Brandname

The brandname of Allied Chemical's anhydrous ammonia is being changed from Barrett Brand to Allied Chemical Anhydrous Ammonia because of the transfer of the sales responsibility for the product from one division to another.

Originally handled by the company's Barrett Division, the product has been transferred to the Nitrogen Division, which now produces and sells the anhydrous ammonia.

Encephalitis Found in L. I.

The eastern equine encephalitis virus, which caused several deaths in New Jersey last year, was found recently to be a cause of death of very young ducks in eighteen flocks on Long Island, New York. Dr. David E. Overton, Suffolk County Health Commissioner, said that a specialist would be hired to work with his department and the County Mosquito Control Commission to learn more about the virus-carrying mosquito, *culiseta melanura*. No cases of the disease have been reported in humans in Suffolk County, but the mosquito has been found in freshwater swamps there.

Dr. Bailey B. Pepper, chairman of the Entomology Department at Rutgers State University, New Brunswick, N. J., said last month that the experience of public-health officials with eastern equine encephalitis in other states indicated that a major recurrence of the disease in New Jersey this year is unlikely.

Charges Against V-C Dropped

Charges of unfair labor practices brought against the Virginia-Carolina Chemical Corp., Richmond, Va., by local 36, International Chemical Workers Union, have been dismissed by the National Labor Relations Board.

In its charges, which grew out of a lengthy strike last summer, the union contended that V-C refused to rehire some workers and to negotiate in good faith at a bargaining session. Employees have been working at the plant without a contract for several months, and negotiating sessions still are under way.

Emilio Viale Dies

Emilio Viale, entomologist and head of field development work for the agricultural chemicals division of Hercules Powder Co., Wilmington, Del., died Dec. 23 of a heart attack. He was 38 years old.

AP&CC District Manager

Dr. Howard E. Kremers has been appointed district manager of market development for American Potash & Chemical Corp., Los Angeles.

Mr. Kremers previously was manager of market development for the company's Lindsay Division. His headquarters are in the company's eastern general sales office in New York.

Armour and Swift Cited

Armour and Co. and Swift and Co. were named last month as co-recipients of the American Association for the Advancement of Science's Industrial Science Award. The award is made annually to a company or companies which bring into significant practical application basic scientific discoveries.

North Carolina Reverses Rule On Fertilizer-Insecticide Mixtures

NORTH Carolina State Board of Agriculture last month reversed its earlier decision outlawing fertilizer-insecticide mixtures. It also authorized the State Department of Agriculture, with the help of N. C. State College, to set up machinery governing the mixing.

The board, in a May 26 meeting, had outlawed the practice after agricultural authorities at the college showed concern about the problems which had cropped up in 1959 when fertilizer-insecticide mixing was permitted on an experimental basis. Action by North Carolina farm groups was responsible for the reversal.

The farmers said that the mixtures were safe and easy to apply. They did not ask the board to force fertilizer producers to mix the chemicals into their products but "to allow the farmers to have the privilege if the firm is willing to cooperate," a spokesman for the farm groups said.

Although most of the fertilizer concerns at the five-hour hearing supported the farmers' views, Dr. Sam Thornton of the Royster Guano Co., Norfolk, Va., said that his firm was unwilling to put insecticides into its products. He said extension services had never approved the mixture and he was "willing to live under the May 26 ruling."

Dr. Clyde Smith of N.C. State said very little was known about the toxic effects on the product sprayed with chemical insecticides and it had not been determined what residue had been left in the soil by insecticides applied in powder form.

New 1100 TPD Concentrated Complete Fertilizer Granulation Plant

Designed by
DORR-OLIVER
for Imperial Chemical
Industries Limited

The more than 40-year-old experience of the Dorr-Oliver organization in designing or equipping nearly 50 fertilizer projects in 17 countries has been utilized in another spectacular development—the largest C.C.F. granulation plant in the British Commonwealth and one of the largest in the world.

The plant is the latest addition to the immense 1100-acre chemical complex operated by Imperial Chemical Industries Limited at Billingham, England. Sulphate of ammonia, monoammonium phosphate and muriate of potash are combined by the Dorrco Granular Fertilizer Process to form a concentrated complete 12-12-18 fertilizer. Two processing units produce a total of 1100 tons per day. Advanced design and extensive use of instrumentation results in high productivity with a relatively small labor force.

If you are interested in the field of fertilizer production, call for a preliminary discussion, or write for information to Dorr-Oliver Incorporated, Stamford, Connecticut.

The services of Dorr-Oliver cover all phases of fertilizer plant design, from economic analysis to supervision of initial operation.

DORR-OLIVER
WORLD-WIDE RESEARCH • ENGINEERING • EQUIPMENT

Dorrco—T.M. Reg. U.S. Pat. Off.

Power Farming Conference

The 9th National Power Farming Conference is being held at Cheltenham, England, Feb. 9 to 11. The theme of this year's program is "Methods and Machines for Arable Crops and Live Stock".

Among the topics to be discussed are: "Keeping the Operator Abreast with the Machines" "Small Scale Farming", and a debate on "Shows vs. Demonstrations". Walter Drew, a director and resident sales executive of Harrison, McGregor and Guest Ltd., and F. W. Morris, Fisons Pest Control Ltd., will debate the latter topic.

IMC Names District Managers

Alexander McBride has been named manager for the Kansas City district by the International Minerals & Chemical Corp., Skokie, Ill. He had been with the U. S. Borax & Chemical Corp. In another move announced by the company, Robert E. Maron has been transferred to the Materials Department as district manager and will cover Indiana and Illinois. He had been a district manager in the company's Direct Application Department.

Heads Salesmen's Group

George W. Poland Jr. of E. M. Sergeant Pulp and Chemical Co., Inc., was elected president of the Salesmen's Association of the American Chemical Industry at the group's annual induction luncheon at the Hotel Commodore, New York, Jan. 19.

Other officers elected for 1960 are: vice president, Preston F. Tinsley, Westvaco Chlor-Alkali Division, Food Machinery & Chemical Corp.; treasurer, Charles E. Griffith, R. W. Greeff & Co.; and secretary, Paul E. McCoy, American Potash & Chemical Corp.

Sulfur From Sulfur Dioxide

The Texas Gulf Sulfur Co., New York, and the International Nickel Co. of Canada reportedly have obtained good results during the first eight months of a try at obtaining sulfur from sulfur dioxide at their Copper Cliff, Ontario, jointly-owned facility. One of the things they have come up with is high-purity sulfur on a pilot-plant scale.

However, the firms are not prepared to say whether the process is economically feasible on a commercial basis.

Velsicol Sales Manager

Harry A. Sidles has been named sales manager of the agricultural chemicals division, Velsicol Chemical Corp., Chicago. He joined the company in 1958 as assistant sales manager and had been with Rohm & Haas Co.

Mr. Sidles replaces Roger W. Roth, who recently was appointed as assistant to the vice president.

Allied Production Director

Allied Chemical Corp., New York, has appointed Virgil A. Romito to the position of production director of the General Chemical Division. He had been maintenance manager.

New Weed Control Chemical

E. S. Hagood, research and development department, Niagara Chemical Division, Food Machinery and Chemical Corp., Middleport, N.Y., has reported that outstanding results in the control of a variety of weed pests have been obtained with a new herbicide development.

Speaking at the recent North Central and Western Canadian Weed Control Conference, Mr. Hagood said that 2,6-dichlorobenzonitrile controlled as high as 99.2 per cent of the wild oats and 98.9 per cent of other annual grasses and broadleaved weeds.

Applications were made under three sets of conditions: as a pre-planting soil-incorporated herbicide, as a pre-emergence, and as a post-emergence. The best results were obtained when the material was used as a pre-planting or a pre-emergent herbicide in quantities of 3 to 4 pounds (of active ingredient) per acre.

Oregon Conference Feb. 11

Four hundred persons are expected to attend a one-day conference on use of agricultural chemicals at Oregon State College, Corvallis, February 11, under joint sponsorship of the college and the State Department of Agriculture. The session will be held in the Home Economics Building.

Originally designed for ground and air applicators of farm sprays and dusts, the February 11 session has been expanded to include representatives of county parks, garden clubs, processors, chemical companies, county agents, and farm, labor and consumer organizations. F. E. Price, dean of agriculture at the college, and Frank McKennon, director of agriculture, will chairman the morning and afternoon sessions, respectively.

Virgil Freed of the state college staff will keynote the session with an opening address on "The Importance of Chemicals to Agriculture".

Other speakers will discuss pesticides from the standpoints of industry, governmental regulations and public health.

State and federal laws relating to all agricultural chemicals, clearance under the federal regulations and labeling requirements will highlight the afternoon program.

BHC On Direct Sale

Diamond Alkali Co., Cleveland, has initiated a "direct sales" price schedule for its technical benzene hexachloride. Formerly, the company had sold BHC and other pesticides to formulators on a consignment, or pay-as-they-use, basis.

New V-C Fertilizer

The Virginia-Carolina Chemical Corp., Richmond, Va., is introducing a premium fertilizer this spring to be sold from all of V-C's 23 sales offices in the eastern two-thirds of the U. S. The new product — V-C Harvest King — will be fortified with a combination of six trace elements.

ARMOUR'S PROGRAM OF PROGRESS

...to serve you better ....

● Armour's modern ammonia plant near Crystal City, Missouri

For over sixty years, Armour has been serving American Agriculture; supplying the ever-growing demand for Armour and Vertagreen brand complete fertilizers by farmers and home gardeners. For more than a decade, we have served the fertilizer industry with phosphate products from our modern phosphate facilities in Bartow, Florida.

Each year, it has been our aim to improve our facilities, products and services. In 1959, Armour took another step forward to serve you better with the acquisition of a modern ammonia plant at Crystal City, Missouri. Now, Armour's service to agriculture and the industry is more complete than ever.

As America's needs for more and better fertilizers continue to grow, Armour Agricultural Chemical Company will continue to improve the products and services that have made the Armour "A" a symbol of quality in the fertilizer industry . . . the "BIG A" in agriculture.

31 sales offices serving the fertilizer industry

ARMOUR AGRICULTURAL CHEMICAL COMPANY
General Offices, Atlanta, Georgia

'Inverts' Discussed at California Weed Conference

THE possibilities of the special use of invert emulsions in weed control formulations were stressed by Norman B. Akesson and Richard Fosse in their report to the twelfth annual California Weed Conference, held January 19-21 in Sacramento, Calif. Mr. Akesson is associate agricultural engineer of the Department of Agricultural Engineering, University of California, Davis, and Mr. Fosse is western technical representative, Amchem Products, Inc., Niles, California.

Akesson and Fosse reported that high viscosity emulsions of the water in oil type, often referred to as invert emulsions, and nicknamed "inverts", may soon play an important role in formulating herbicides, where large spray particle size and low drift applications are desired.

Investigations by the agricultural engineering department of the University in cooperation with scientists of Amchem Products, Inc., indicate that drift or the undesired movement of chemicals during application can be significantly reduced with the "inverts". Tests show that aircraft application will be most benefited by the availability of these formulations, since hazards of drift are inherently greater from aerial than from ground application. However, ground applications also may benefit in terms of lessened drift hazard and greater sticking or depositing characteristics of the invert emulsion.

The pair of researchers reported that certain changes in pumping and distribution equipment will be needed to convert the conventional aircraft or ground sprayer to handle "inverts". They explained that larger capacity (but at lower pressure) pumps, flow lines, valves and nozzles are required for the unrestricted flow of the thick invert emulsions.

As a result of their research, Akesson and Fosse believe that pesticides formulated with invert emulsions will lend greater freedom of use to the so-called hazardous chemicals which now must be limited due to drift danger.

Soil Mixing Vs Surface Application

The soil incorporation of herbicides in relation to the advantage of this type application over surface application was discussed by J. Antognini, Stauffer Chemical Co., Mountain View, Calif. He reported that a number of herbicides show greatly increased activity when incorporated into the soil, — which means lower rates of application, and consequently greater economy to the farmer. "Soil incorporation", he said, "greatly minimizes the variability in results brought about by differences in soil moisture." He emphasized, however, that before soil incorporation of most herbicides is accepted, considerable basic research is needed. Water solubility, volatility and other chemical-physical properties of herbicides, which affect their distribution and re-distribution in soils must be determined. Basic research is also needed, he said, on the degree of incorporation obtainable with various types of equipment.

Herbicides for Legumes, Aquatics

R. H. Schieferstein, Chipman Chemical Co., reported on application of 2,4-DB for selective control of certain broad-leaved weeds in legume crops grown for seed. He suggested that this new herbicide can be of great benefit to the farmer, but emphasized that for best results, the manufacturer's label instructions be followed. "While results obtained with 2,4-DB from field scale commercial usage in 1959 were good, greater stress on proper timing of applications is important if best control of broad leaved weeds is to be obtained."

Reporting on research and development in aquatic weed control, G. J. Berry, U. S. Bureau of Reclamation, declared that demands of an increasing population for more water for irrigation, domestic and industrial uses, and for recreation, has focussed greater attention on aquatic weed control. With this new emphasis on aquatic weed control, manufacturers are screening a long list of compounds as potential aquatic herbicides. As a result, he said, 20 new experimental herbicides have been added to the present list of aquatic weed killers.★★

•

Spencer Advertising Manager

Herbert A. French has been named advertising manager, agricultural chemicals, by the Spencer Chemical Co., Kansas City, Mo. At the same time, the company named James W. Murray to the position of advertising production manager. Both men joined the company in September, 1952.

•

Purchase California Firm

Arizona Fertilizer and Chemical Co., Phoenix, has purchased the Arical Co., Blythe, Calif. Arical produces fertilizer and insecticides for the Palo Verde Valley of California and the Parker area of Arizona.

•

Sole In New location

The Sole Chemical Corp. has moved to new and larger headquarters at 7740 South Chicago Ave., Chicago 19, Ill.

•

TVA Cuts Fertilizer Output

About 219,400 tons of experimental fertilizers were produced by the Tennessee Valley Authority in fiscal year 1959, compared with 240,000 tons in 1958, according to TVA's annual report. In addition, distribution of major fertilizer materials in cooperative education programs totaled nearly 236,000 tons, a decrease of 6,800 tons from the year before.

Superphosphoric acid, developed by TVA, was used in making 28,000 tons of 54 per cent concentrated superphosphate and in the formulation of liquid fertilizers of higher analysis than have been made by the industry, the report said.

You're really hitting the jackpot when you get better multiwalls for less money . . .

Bemis
EXTENSIBLE Multiwalls

They are better than conventional multiwalls because they are shock-resistant. Two years of use prove that breakage is greatly minimized. And they frequently cost less because the greater strength lets you use a lighter basis weight bag. Read these convincing quotes from men who have had ample experience with Bemis Extensible Multiwalls . . .

"We are saving $7.10 per thousand with Bemis Extensibles, a 5½% reduction in our bag costs."

"Our savings in cost have been about $7.00 per thousand. We have had much less breakage than we previously had. In addition, our employees at the plant say that extensible bags are much easier handled at the scales and much easier to sew."

"These extensible bags are the best paper bags we have ever used. As far as I am concerned, we won't use anything else."

"We haven't had a serious complaint since we switched to your 'stretch' bag."

"We broke only two bags in two weeks. We don't want anything else."

Bemis pioneered extensible multiwalls. We have had longer experience with them than any other bag maker. You can profit by that experience. Get in touch with your Bemis Man.

Bemis *Where flexible packaging ideas are born*

General Offices—408-L Pine Street, St. Louis 2 • Sales Offices in Principal Cities

Bishop Named State Leader

William D. Bishop has been appointed state leader of agricultural programs by the University of Tennessee agricultural extension service. Dr. Bishop has been with the university since 1943 when he was assistant county agent in Marshall County. He was appointed assistant agronomist in 1950 and has been leader of the extension agronomy department since 1957.

•

Plan Experimental Farm

Monsanto Chemical Co., St. Louis, Mo., has purchased approximately 500 acres of farmland in Missouri's St. Charles County as the future location of an experimental farm for agricultural chemicals research.

The company plans to start improvement of part of the property promptly and to utilize a portion of it during the 1960 growing season.

•

Sulphur Export Elects Two

Peter A. Dimitri and Ernest A. Graupner have been elected vice presidents of the Sulphur Export Corp., New York. The company handles marketing outside of North America and Cuba on behalf of domestic producers of Frasch sulfur.

Mr. Dimitri had been director of sales for Sulphur Export Corp. (Sulexco) since it was established in 1958. Mr. Graupner had been with the Texas Gulf Sulphur Co.

•

Witco Expands In Europe

Witco Chemical Co., New York, has acquired a minority interest in its English subsidiary, Witco Chemical Co., Ltd., and has elected Cuthbert C. Hallett, managing director of the subsidiary, to the parent company's board of directors.

•

Indiana Pesticide Conf.

The 2nd annual Indiana Agricultural Pesticide Conference was held at Purdue University, Lafayette, Ind., Jan. 25 and 26. The meeting was a part of Farm Science Days, a week-long series of meetings and shows held annually on the campus.

J. V. Osmun of Purdue presided over a conference on current insect problems that centered mainly on corn leaf aphids, soil insects, stored grain pests, and the face fly on livestock. Speakers included: R. T. Everly, corn insects; G. E. Gould, soil insects—insecticides; M. C. Wilson, spittlebug control; and R. C. Dobson, livestock insect control. All speakers were Purdue entomologists. J. Favinger, a state entomologist, discussed the Japanese beetle situation in Indiana.

Other sessions covered the use of pre-emergence herbicides for weed control with emphasis on granular applications and application equipment, and weed, insect, and plant disease control recommendations for 1960.

•

Parks Named Asst. Manager

Paul Parks has been appointed assistant manager of the Cincinnati division of the Armour Agricultural Chemical Co., Atlanta, Ga.

He joined Armour in 1950 and was appointed sales aide in the Cincinnati division in 1958.

Liquid Fertilizer Conference

The establishment and operation of liquid fertilizer plants will be one of the topics covered at the Southern Regional Liquid Fertilizer Conference being held at Rock Eagle 4-H Club Center, Eatonton, Georgia, Feb. 9 to 11. Hixen Guest, owner of a liquid fertilizer plant at Oglethorpe, Ga., will speak on the subject.

Others scheduled to appear on the program include: W. W. Arnold, Nitrogen Division, Allied Chemical Corp., New York, "Corrosion Problems"; Ernest M. Harper, Alyco Fertilizer Co., Sullivan, Ill., "Sources of Materials for Formulating Fertilizer Ratios Applicable to the South"; Morris Woosley, Western Kentucky Liquid Fertilizer Co., "Equipment for Handling, Delivery, and Storage of Liquid Fertilizer"; Ralph Sasser, Assistant Duplin (N.C.) County Agent, "Custom Application vs. Farmer Application."

Group meetings are planned to cover the uses of liquid fertilizer; research; educational problems; and production, distribution, and sale of liquid fertilizers.

Larrick Calls Safeguards On Pesticides Essential

"WHEN society adopts the belief that poisons should be allowed in food, in safe amounts, for the technological benefits that flow from their use, — it is essential that it require appropriate safeguards to be placed around use of the poisons", observed George P. Larrick, commissioner of Food & Drugs, in addressing the American Farm Bureau Federation in Chicago in mid-December. Rules that specify safe conditions for using toxic materials do not, by themselves, safeguard public health, he pointed out, there must also be a mechanism for enforcing the safety rules.

Mr. Larrick cited the lack of an adequate analytical procedure for determining the presence of aminotriazole on cranberries when this herbicide was first placed on the market, and was used in cranberry bogs. Government chemists were set to work to determine suitable analytical procedures, — but this took time, remarked Commissioner Larrick. "When the method was finally available, and the examination of interstate shipments confirmed the presence of aminotriazole in cranberries, the situation was out of control."

The cranberry affair is not an isolated case, reported Mr. Larrick. Quantities of frozen spinach have been removed from the market because growers applied DDT too near harvest; — other crops have been seized because some growers had applied parathion "unwisely".

"We must be in a position," concluded Mr. Larrick, "to assure the public it is receiving adequate protection. Enforement of the pure food and related laws must keep pace with rule making. This is a matter that deserves careful consideration by all of us."

Write for leaflet showing details of specially modified sprinkling can; also contains other useful data on use and handling of Oldbury sodium chlorate, the original weed killer.

This is how simple it is to kill all these weeds:

Russian knapweed
Bermuda grass
Hoary cress
Johnson grass
Austrian field cress
Bindweed
Leafy spurge
Canada thistle
Quack grass

All it takes is a sprinkling can and some inexpensive OLDBURY® sodium chlorate to rid any area of these and other bothersome weeds.

No expensive equipment. No costly chemicals. OLDBURY sodium chlorate costs only about 25¢ per hundred square feet of area.

Fast delivery • Hooker plants at Niagara Falls, N. Y. and Columbus, Miss., speed sodium chlorate to you whenever you want it.

Technical help • Full-time Hooker agronomists are ready to help you with weed control plans and to advise you on handling, storing, and using sodium chlorate.

99% pure • You can get 99% pure OLDBURY sodium chlorate in 100- and 450-lb. steel drums. For prices and further shipping information, write today.

Railroad rights-of-way • Use the skilled services of specialists who apply formulations made with OLDBURY sodium chlorate.

Defoliating cotton • Other special formulations are available for this use, especially in irrigated areas.

For names and addresses of these specialist firms, write us.

HOOKER CHEMICAL CORPORATION
602 Buffalo Avenue, Niagara Falls, N. Y.

HOOKER
CHEMICALS
PLASTICS

NIALK® CHEMICALS
OLDBURY® CHEMICALS
SHEA® CHEMICALS
DUREZ® PLASTICS

Sales Offices: Chicago, Ill.; Detroit, Mich.; Los Angeles, Calif.; New York, N. Y.; Niagara Falls, N. Y.; Philadelphia, Pa.; Tacoma, Wash.; Worcester, Mass. *In Canada:* Hooker Chemicals Limited, North Vancouver, B. C.

Chloro-IPC Consultant

The Columbia-Southern Chemical Corp., Pittsburgh, has appointed Dr. Richard L. Sawyer of Cornell University as a consultant for the firm's program on the development and application of Chloro IPC for sprout inhibition of potatoes.

Dr. Sawyer is an associate professor in the department of vegetable crops at Cornell. He has taken a six-month leave of absence from Cornell and now is cooperating with experimental and extension workers of the states developing the application of Chloro IPC under storage conditions which are peculiar to each of the different potato producing areas.

•

Low-Residue Tedion

A low-residue formulation of 90 per cent Tedion for mite control is being offered by Niagara Chemical Division, Food Machinery & Chemical Corp., Middleport, N. Y.

The new material was designed to minimize residues in the treatment of such ornamentals as roses, carnations, and chrysanthemums.

•

Mosquito Control Program

A town-wide mosquito control program, aimed at preventing a possible outbreak of eastern equine encephalitis, will begin in Greenwich, Conn., next month.

Dr. Erval R. Coffey, health director, who received $27,331 in town funds last month for the project, said that encephalitis virus had been found in birds and horses in the state.

The town program will involve three phases. The first will call for the dry dusting of DDT at the rate of one pound per acre on frozen woodland swamp areas to prevent mosquito breeding.

The second step will entail a misting with a 5 per cent DDT emulsion at the rate of one-half pound per acre on all areas in which mosquitos are breeding. The third includes the spraying with the emulsion of storm drain catch basins.

Dr. Coffey said a survey by his department had shown there were 300 potential breeding areas embracing 150 acres. Property owners are being asked to give written permission for department personnel to carry on the work.

•

Dallas Office Is Closed

The West Virginia Pulp and Paper Co., New York, has closed its Dallas, Texas, office and now is processing all orders for multiwall bags formerly handled at Dallas directly through the New Orleans bag plant of its Multiwall Division.

•

Named To New Position

Donald F. Stauffer has been appointed to be in charge of technical service and development work in Canada for the Hercules Powder Co.'s Naval Stores Department. Mr. Stauffer will function as coordinator between all divisions of the department and Canadian customers and distributors in the newly-created position.

•

Adds To Purchasing Duties

Robert E. Crockett, who has served as purchasing agent for the International Paper Co.'s northern division mills and its Bagpak and Single Service divisions, has assumed responsibility for the purchasing activities of the company's container division as well.

Panogen Names Pair

Panogen Co., a division of Morton Chemical Co., Chicago, has appointed two sales representatives to cover the west coast and the southeast. James H. Hughes is headquartered in California and J. E. Driggers is headquartered in Florida.

•

Stepan Aquires Ris-Van, Inc.

Stepan Chemical Co., Chicago, has acquired Ris-Van, Inc., a Belmond, Iowa, manufacturer of liquid fertilizer. Ris-Van will be operated as a wholly-owned subsidiary.

•

New Diamond Herbicide

A new herbicide for control of crabgrass and other annual weeds has been announced by Thornton F. Holder, director of research and development for Diamond Alkali Co., Cleveland.

According to Mr. Holder, the chemical, Dimethyl Tetrachloroterephthalate, called Dacthal, prevents the germination and growth of crabgrass when it is applied early in the Spring. Available as a dry formulation, Dacthal will be offered to the consumer in various test markets during the coming season by Swift and Co. under their brand name, RID.

Huisking Observes 50 Years with Plans for Further Expansion

OBSERVING its 50th year in 1960, Chas. L. Huisking & Co., New York, announced plans for further expansion of its facilities. The firm, which began as an exporter-importer and distributor of drugs, chemicals, cod liver oil, essential oils and other raw materials, is today a manufacturer of drugs for pharmaceuticals and proprietary drug products and specialty chemicals.

Glyco Products Co., acquired by Huisking in 1958, operates as a division of Chas. L. Huisking & Co., producing various emulsifiers and specialty chemicals for the agricultural, food, paint and other industries. Other divisions include the Peder Devold Oil Co. and the Clintbrook Chemical Co.

Chas. L. Huisking & Co., Inc., was founded by Charles L. Huisking in 1910, and today is operated by his three sons: president, William W. Huisking; vice president in charge of operations at Lyndhurst, N. J., Edward P. Huisking; and secretary, Richard V. Huisking. The founder, Charles L. Huisking, continues to take an active part in the firm's operation.

The Huisking Company is probably best remembered for its connection with "Conti" castile soap. Huisking was named in 1918 as one of three American distributors for Conti Castile. Later, in 1924 the Huisking Company organized a subsidiary, Conti Products Corp., which today markets a line of soap specialties.

NEARLY A MILLION ACRES will be made more productive this year . . . with fertilizers

FORTIFIED WITH
F.T.E*
(Fritted Trace Elements)

*REGISTERED TRADE MARK OF FERRO CORPORATION

A fivefold increase! Yes, the use of FTE for high-productivity fertilizers has increased 500% in the past three years. Manufacturers have tried them, liked them . . . and their customers, the users of fertilizers, have been happy with the results, so have consistently bought *more and more* "FTE-fortified" fertilizers.

Where trace elements are needed, FTE provides real advantages. Being *fritted,* and slowly soluble on a *controlled,* predetermined basis, FTE stays in the soil (won't leach out) and supplies needed nutrients to crops *all through* the growing season. Equally important, there are no toxicity hazards.

All six minor elements are combined in FTE. Plants get boron, iron, manganese, zinc, copper and molybdenum—exactly as needed. And as little as 1% to 1½% of FTE in the mix has proven effective in commercial fertilizers.

If you're not now using FTE, may we suggest you get some and try it? Now is the time to prove it out for *next* year.

FERRO
FERRO CORPORATION
Agricultural Division
4150 East 56th Street • Cleveland 5, Ohio

Trenton R. Tunnell Dies

Trenton R Tunnell, president of the Ashcraft-Wilkinson Co., Atlanta, Ga., died recently in Atlanta. He was 59 years old. Mr. Tunnell, who joined the company in 1920, was named president last summer.

•

Farm Machinery Conference

The 29th annual Farm Machinery Conference was held Jan. 29 and 30 at the University of California, Davis. among the topics discussed were: regulations and safe handling in the application of pesticides; the development of a four-wheel-drive tractor.

Exhibits and demonstrations held in conjunction with the meeting included overhead sprayers, mechanical tree toppers, vertical mulchers, harvesting equipment.

NW CONFERENCES

(*From Page* 29)

REVOCATION of the tolerance on heptachlor will force entomologists to seek a new means for controlling some of the nation's most important economic pests. This was indicated by Emory Burgess, Washington, D. C., director of the plant pest control division, USDA ARS, who was a featured speaker at the Northwest Agricultural Chemical Industry conference.

His division is not staffed nor equipped to carry out alternative research, so cooperation of industry, the state and allied research groups will be essential.

"The day is not yet in sight when the food, feed and fiber requirements of the nation can be satisfied without the use of agricultural chemicals," he declared.

Wildlife apparently was not damaged by the use of toxicants in combatting the imported fire ant in the south, he added.

Burgess traced eradication of the Hall scale, against which there there was no known means of effective control when it was first discovered in California.

Presence of the Khapra beetle in Mexico has greatly complicated the battle against this menacing pest, but progress is being made. Research entomologists developed means of making gas-tight plastic sheathing for buildings covering as much as a city block, a development which has greatly simplified the work, Burgess explained.

Discovery of the beetles on steel beams and Simca cars at ports of entry has helped prevent the pest gaining a foothold in widely distributed spots. However, there is a need for tools which will enable entomologists to locate the beetles, as well as other pests, in low population levels.

Growers were warned to take a good look at their use of 2,4,-5TP because there is no tolerance level for it. This was the word from Kenneth E. Monfore, chief, Seattle district, Food & Drug administration. The material is widely used in the Pacific northwest on apples, pears, and prunes.

The need for safe foods is paramount if western civilization is to survive, Monfore told the industry men, "but this increase in production must not occur at the expense of the safety or purity of our foods."

The speaker also went into the problem presented by utilization of by-products of processing agricultural products. Often residues are increased—DDT in apple pomace, for example.

Microbial insecticides and the almost unlimited possibilities which they offer were discussed by Graham Randall, Portland, Stauffer Chemical Co. technical representative.

Need for an opportunity to work in the field for at least a year with new agricultural chemicals before they are introduced for sale was brought out by Dr. Robert E. Jones, Yakima, Wash., president of Norkem corporation. Sometimes recommendations for use that are satisfactory in California are not applicable in the Pacific northwest, he explained.

Also, this year-in-advance permits demonstration of the new material to agricultural leaders of the area, speeding up acceptance when the products become commercially available. In addition, distributors, dealers, salesmen and others (including applicators) can be educated concerning the best method of handling the new materials.

"Because we are dealing with people, all we can do is attempt to get them to read the label in an endeavor to control misuse of the materials," Dr. Jones added. When there is a time limit on application of the chemical, his firm goes out in the field and picks up any that has not been used at the deadline, crediting dealers and orchardists accordingly.

Mistakes have been made, but that is inevitable if there is to be progress, David Bischoff, Vancouver, Wash., agronomist for the Washington Canners cooperative, commented in the panel discussion on introductory sales of new agricultural chemicals.

Simplification of names for the new chemicals is much needed, he added.

A very serious problem arises in grasshopper control as a result of federal action on hepatachlor, Robert Every, Oregon State college extension entomologist, remarked during the same panel discussion. Farmers have available a material which works better than the bait they will be told to use, and there is no guarantee that this will not be a bad grasshopper year.

Increased control over use of agricultural chemicals seems almost inevitable, it was indicated by Allen Baker, Olympia, Wash., supervisor, grain and chemical division, Washington state department of agriculture. In addition to the cranks and faddists, there are "do-gooders" looking for a cause to sponsor, he declared in urging the agricultural industry to wean the do-gooders "before the quacks get their job done."

Baker suggested that the agricultural chemical industry budget a portion of its advertising appropriation for public education to forestall hysteria concerning its products. The industry is one of the most highly self-policed, but the public is unaware of this.

There is great need to tell the public what the industry has done and is doing to reduce disease, lengthen the life span and make it more enjoyable, was the way he summarized his remarks.

"We will be faced increasingly with resistant organisms," forecast Dr. Virgil Freed, Oregon State college agricultural chemist, in commenting that already some plants are showing increasing resistance to herbicides.

A wetting agent which keeps a liquid film on the leaf, slowing up crystallization, greatly increases effectiveness of those materials which are to be absorbed. Only 10% as much energy is required from the plant in the liquid assimilation, according to Dr. Freed.

"You could cut off a year in your field testing if you had adequate information on the chemical and physical properties of the new material," he continued, in advocating a more systematic approach to the problems.

Toxicological studies will be more and more toward the effects on enzymes, with the key to cancer-producing properties lying in the binding of a chemical in a certain position on the enzyme surface, Dr. Freed declared.

"Once we understand the structure of the chemical and its relation to biological activity we can begin to build the materials for specific conditions," he remarked in explaining that more fundamental understanding is needed of how chemicals act at the enzyme level.

This year's industry session was the best-attended in the history of the northwest organization, according to Charles O. Barnard, San Jose, Calif., executive secretary, Western Agricultural Chemicals association, which has sponsored the regional meeting.★★

. . . an open letter

to: AGRICULTURAL CHEMICALS' 5000 Subscribers

THE scandal attending disclosure of some of the things that have been going on in TV has severely shaken the faith of a large section of the American public in advertising. Those who collaborated in the various frauds that have been exposed bear a heavy responsibility. Having fooled "some of the public some of the time," they ignored the old adage and didn't seem to know when to stop.

And, lest we be accused of adopting a too self-righteous, holier-than-thou attitude, let us be the first to admit that there are occasional abuses in the magazine publishing business, — items occasionally slip by, for example, where the reader is given a sales story under the guise of editorial content.

There cannot be too much of this sort of thing, however, in a magazine distributed to a "paid subscription" audience, for the readers simply won't stand for it. AGRICULTURAL CHEMICALS, by the way, is one of the few paid circulation magazines in its field, and the only one with audited paid subscriptions. The basic philosophy behind the paid circulation publishing business, of course, is that a magazine exists first and foremost to serve its subscribers—not the advertisers.

The editorial content of any self-respecting magazine, according to our theory of the business, must be designed to serve the reader—not to sell some product or service of the advertiser. Just for the record, let's repeat and emphasize this point. We in the business of publishing paid circulation magazines *serve our subscribers first.* We control and produce our own programs, which consists of our editorial content. Then, if that content is valuable enough to our readers to attract and sustain continuing readership, — we have something to sell our advertisers, — that interested readership.

This is a claim that other media cannot make. No such imperative necessity to offer content of clearly apparent value applies to TV, to direct mail, nor to "free distribution" magazines. They can all continue to exist, to beam their programs, mail their issues, carry their advertisers' stories, whether there is an active audience for them or not.

By contrast, reader interest is a "must" for the paid circulation magazines. If we don't hold the interest of our subscribers, we have nothing to offer our advertisers. We dare to let our subscribers decide if we will stay in business.

*To AGRICULTURAL CHEMICALS' 5,000 subscribers**, we say, "Thanks for your continuing vote of confidence." Since our circulation is currently at an all-time high, you apparently agree that we are offering a valuable service that is worth paying for.

To our advertisers, — this reminder. The fact that 5,000 of your best customers and sales prospects are willing to put out their own hard cash to make sure they see every issue of the industry's leading trade paper is what makes AGRICULTURAL CHEMICALS your most valuable and productive advertising medium. You know our issues are *wanted,* because they are *ordered.* You know they are *read,* because they are *paid for.* And you know our 5,000 subscribers, who include the top executives and management personnel in the industry, *get every issue,*—not just an occasional free copy.

* Total Monthly Distribution — 7,000 copies.

THE EDITORS

AGRICULTURAL CHEMICALS

Leader in the field

CALDWELL NEW JERSEY

Equipment, Supplies, Bulletins

Attapulgite Bulletin

The Magnet Cove Barium Corp., Houston, Texas, has prepared a booklet describing its line of attapulgite products. The bulletin describes the mining of attapulgite at Magcobar's Hinson, Fla., plant and discusses the uses of attapulgite; as a carrier for agricultural pesticides, as a gelling agent in fluids or muds used in the rotary drilling of oil wells, and as a refining agent for lubricant and specialty oils.

•

Hub States Catalog

The Hub States Chemical & Equipment Co., Indianapolis, Ind., has issued an 82-page catalog covering its line of pest control chemicals and equipment.

•

Vapor Detector Bulletin

Details on a new M-S-A Mercury Vapor Detector for on-the-spot checking of dangerous concentrations are included in a bulletin issued by the Mine Safety Appliances Co., Pittsburgh, Pa.

The illustrated bulletin outlines industrial applications of the detector and is available from the company at 201 North Braddock Ave.

•

Automatic Bag Hanger

An automatic bag hanger which supplies empty open-mouth multiwall bags to a filling machine and places them on the loading spout is being offered by the Union Bag-Camp Paper Corp., New York. The unit is adaptable to all Union I & C Bagger models.

Knoedler Bulk Bodies

Knoedler Manufacturers, Streator, Ill., is offering auger-equipped truck bodies for the bulk delivery of fertilizer with any type of truck. Basic models are the 12-ft. and 8-ft. lengths, with top box extensions increasing the capacity of each so that the actual range of sizes is 2, 2½, 3, 4, and 5 tons. Twin compartments permit the hauling of different types of fertilizers.

•

Soil Testing Movie

A 15-minute sound and color movie on soil testing has been prepared and released by the Soil Testing Division, North Carolina Department of Agriculture and the Visual Aids Department of N. C. State College. The National Plant Food Institute cooperated in the production of the film through a grant made to the soil testing lab.

•

Three Monsanto Bulletins

The Monsanto Chemical Co.'s Inorganic Chemicals Division has published three technical bulletins covering the bulk handling and storage of sulfuric acid and oleum, chlorosulfonic acid, and muriatic acid.

The illustrated bulletins are designed to give technical assistance in setting up safe procedures for handling of the materials. Copies are available from the company at 800 North Lindberg Blvd., St. Louis 66, Mo.

•

Dyna-Fog Booklet

Curtis Automotive Devices, Inc., Westfield, Ind., has prepared a folder that describes its Dyna-Fog line of insecticide applicators. In addition, the company is offering a new insecticide fog generator, the Dyna-Fog "50". Full information is available from the company.

Smith-Douglass Favors Stretchable Multiwall Sacks

SUBSTANTIAL reductions in packaging costs have been realized by Smith-Douglass Company, Norfolk, Va., one of the nation's leading producers of fertilizers and agricultural chemicals, since they began packing their products in multiwall sacks made with stretchable paper.

For the past year and one half, the company has conducted intensive tests to compare the performance of bags made with the new stretch paper against regular kraft multiwalls. In the process, approximately one million bags were used.

"As a result of our experience, we are convinced that the performance of stretchable paper bags far surpasses ordinary kraft bags," states J. B. Lynch, general purchasing agent for Smith-Douglass. "The greater stretch of stretch paper provides us with a 30% safety factor against breakage at no extra cost," he points out,. "besides helping us overcome problems encountered in storage, filling, sewing and handling operations."

Smith-Douglass often stores bags for periods ranging from 30 days to 6 months before using them. Conventional bags had a tendency to dry out and become brittle, the company found, and consequently broke under sudden impact loads of filling with 50, 80 or 100 pounds of plant food or feed products.

This problem has been minimized since the switch was made to bags made of stretch paper. The lower porosity stretchable paper enables it to retain its manufactured moisture content of 4 to 6% during storage. Because they don't become brittle, breakage occurs less often.

Sales for Smith-Douglass came to over $39,000,000 last year. In addition to its Norfolk plant, the company has manufacturing operations located at Albert Lea, Minn.; Danville, Va.; Granite City, Ill.; Houston, Texas; Kinston, N.C.; Plant City, Fla.; Streator, Ill.; Wilmington, N.C.; and Texas City, Texas, (Texas City Chemicals, Inc.—a wholly owned subsidiary).

The company is a major supplier of farm fertilizers, animal feeds, and garden supplies.

A PLANT designed to remove sulfur from petroleum products is under construction in England at the Shell Haven refinery in the Thames Estuary. It is expected to be in operation in October.

•

EDWARD H. METZ has been named controller of the Hayes-Sammons Chemical Co., Mission, Texas.

AC

PHILIP E. STONE, formerly technical assistant, has been named assistant to the manager of the fertilizer division, Virginia-Carolina Chemical Corp., Richmond, Va. He is succeeded by John M. Daniel Jr.

FERTILIZER WORKSHOP

(*From Page* 45)

from crops in a southeastern section of Pennsylvania.

Fertilizer makes the farmer money! Farmers can increase profits substantially, concluded Mr. Williams, with average management and good practices. He suggested that the data presented could be used effectively in increasing sales of fertilizer to farmers.

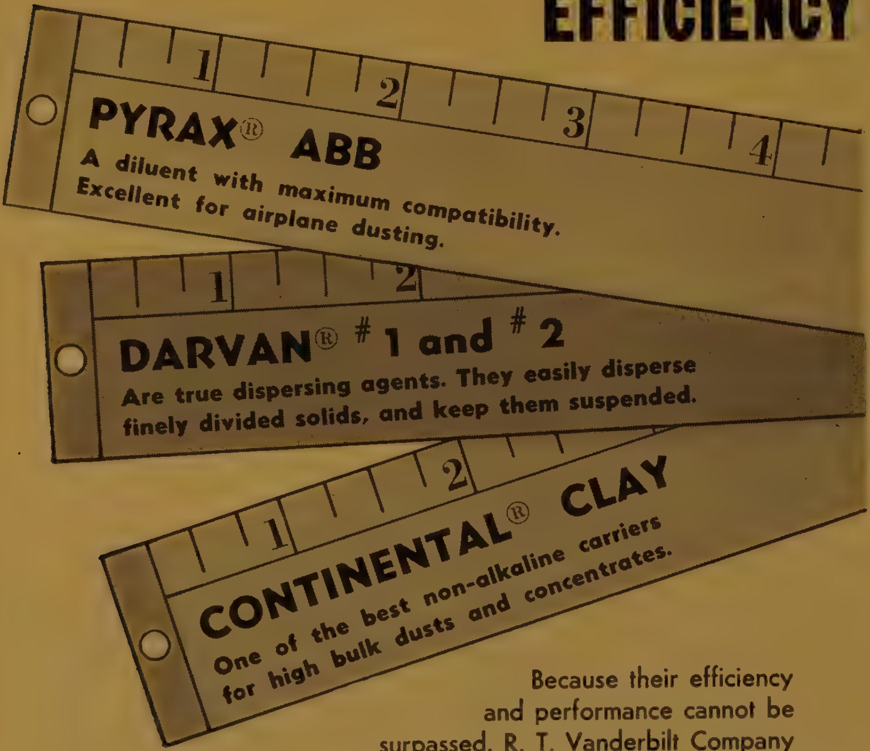
There's A Real Fertilizer Potential

AGRICULTURE is a rapidly changing field, observed Howard B. Sprague," Pennsylvania State Univ. "With the great concentration of population in the northeastern quarter of the United States, the greatest pressure for change in agriculture may be experienced there". This region, he said, will probably lose some of its geographic advantage arising from proximity to markets, because of intense competition from other agricultural areas. The northeastern states will have an agricultural future depending on the efficiency with which they produce agricultural products, in direct competition with other regions.

"The farm operator", remarked Mr. Sprague, "who has bought additional land needs soil tests and good advice on lime and fertilizers. He is a business farmer, and likely to respond to newer knowledge that will increase net returns of the farm. It is probable that business farmers will be interested in custom application of both lime and fertilizer, when the service offered is a complete one of soil testing, supplying and spreading lime and fertilizer, evaluating results, and guidance on best use of feed produced."

Merle Adams, NPFI district representative, further stressed opportunities in selling fertilizer to the business farmer. "Although farmers in the northeast have been using fertilizer for many years, in most cases," he said, "they are not using enough of it for efficient crop production." Yield goals can be supplied (to the salesman) by extension service personnel for many areas in the northeast. If you have conducted successful demonstrations in the past, the yields obtained from them can be useful guides in establishing goals. "Dem-

YARDSTICKS FOR FORMULATING EFFICIENCY



PYRAX® ABB
A diluent with maximum compatibility.
Excellent for airplane dusting.

DARVAN® #1 and #2
Are true dispersing agents. They easily disperse finely divided solids, and keep them suspended.

CONTINENTAL® CLAY
One of the best non-alkaline carriers for high bulk dusts and concentrates.

Because their efficiency and performance cannot be surpassed, R. T. Vanderbilt Company carriers have become the yardstick against which other products are measured.

Why settle for less, when true economy calls for the best? These diluents and dispersing agents enable toxicants to do a better job. With Vanderbilt carriers your dusts and sprays will cling, cover and kill. Get the full facts today — use this handy coupon.

R. T. VANDERBILT CO., SPECIALTIES DEPARTMENT
230 Park Avenue, New York 17, N. Y.

Please Send Technical Bulletin 23D

State Application ______

Name ______

Title ______

(Please attach coupon to your Company letterhead) P-1

onstrations can be very helpful in convincing farmers that they can reach the yield goals you are talking about. In summary, we will benefit, the farmer will benefit, and the customer will benefit, if we can raise our customers' sights and convince them to shoot for higher goals."

Re: College Recommendations

"A GREAT strength of college fertilizer recommendations is that they bear the official stamp of approval," observed R. E. Wagner, northeast director, American Potash Institute. "As such, they are a valuable selling tool for the fertilizer salesman.

"We hear it said that the day of the quick pep talk in sales work is over. The salesman must have a service to sell and he must gain the confidence of his customer. There is no better way to gain confidence with most customers than to sell the product on the basis of college recommendations, which are published in printed form at regular intervals and are readily available at county agents' offices or at the college.

"More and more, the fertilizer industry is being asked to participate, in one way or another, in the development of official recommendations. It is both an obligation and an opportunity for industry representatives to work closely with college people in this and other phases of fertilizer programs.

"There is a feeling that state recommendations are not as helpful as they should be in selling fertilizer because they are too conservative or the wrong grade or ratio is recommended. There is concern that sometimes recommendations of different states bear little resemblance, even though the same crop and similar soils are involved.

"Some of this criticism undoubtedly is justified. General recommendations at best are a matter of a series of compromises and averages calculated to meet most nearly the needs of the majority. In contrast, soil tests, together with a record of previous cropping and fertilizer practices, give a fertilizer and lime prescription for each field on the farm; but, unfortunately, only a small percentage of farmers now take advantage of soil testing. In Pennsylvania, for example, it is estimated that only one out of 30 fields is tested.

"Therefore, the majority of farmers are served or influenced in one way or another by the general recommendations. It is encouraging that real progress has been made in recommendations during the past ten years, particularly with forage which represents over 30 million acres of pastures and hay lands in the Northeast. Generally speaking, less change has taken place in recommendations for the 8½ million acres of corn and small grains in the region."

Concluding his remarks, Mr. Wagner advised, "To take state recommendations and get them used on more forage acres would render a real service to farmers and at the same time, sell more fertilizer. It will take more than lip service. Vigorous use of state recommendations is needed in sales programs. It is not difficult to show the farmer that he can increase his yields, as well as that all-important item of income, by using college fertilizer recommendations. Here is an unusual opportunity for fertilizer salesmen."★

NEW PESTICIDE

(From Page 49)

marily for agricultural use. A Silikil Aerosol has also been developed for household use. This product contains 7½% active silica gel.

Silikil is now available with other insecticides which not only give it the properties of quick knockdown, but also multi-purpose control of insects.

Present Silikil combinations include,

Silikil-DDVP
Silikil-Pyrenone
Silikil-Dibrom

The addition of toxicants does not decrease the sorptive qualities of Silikil. Silikil-Pyrenone products carry a non-injurious label when used as directed. Silikil-DDVP and Silikil-Dibrom both have the advantage on roaches of fuming action to flush out and knockdown the adults within minutes, with the Silikil always present to control adults as well as hatching roaches for long periods.

Dosage Rates

Dosage rates are usually one pound of Silikil per 1,000 square feet for the control of household insects. To control fleas on dogs and cats, it is suggested that one to two ounces be dusted on the animal. When used as a dust on agricultural crops, 40 to 50 pounds per acre are suggested.

In the control of adult armored scale on deciduous and citrus fruit trees, four pounds of Silikil per 100 gallons of water in full volume spray is used. The addition of light oils of 1 to 2% to Silikil has looked extremely promising on red scale on citrus. To control flies, 2 pounds per 1,000 square feet are used as a residual deposit dusted on their resting places. Silikil may be combined with Dibrom for quick knockdown.

Silikil shows excellent promise also for use with many insecticides as a residual extender for agricultural insecticides. Silikil not only enhances the residual control, but aids greatly in deposit. For this purpose, Silikil may find its widest use as an insecticide.

Research is continuing on Silikil at various state agricultural experiment stations, USDA stored product insects and grasshopper control centers, and at the U.S. Public Health Communicable Disease Center.

Test evaluations in conjunction with the National Pest Control Association have been conducted with over forty pest control operators. The acceptance in this field has been excellent.

Silikil is now being produced in large quantities and new improvements in manufacturing techniques will make this product an economical, non-toxic insecticide for agricultural as well as household usage. With resistance to organic phosphates and chlorinated hydrocarbons becoming ever increasingly present, Silikil offers a new hope to the agricultural chemicals industry.★★

NEW HERBICIDES

(*From Page* 43)

Johnson and Bermuda grass, the usual rate is 10 pounds per 100 gallons of water. As with all translocated materials, it should be applied when there is sufficient foliage to absorb and translocate the chemical. For annual grasses lower rates are satisfactory. Selective use depends to some extent on keeping rates low, 4 to 6 pounds per acre. In vineyards, the higher concentration is used, but the volume is kept to a minimum that will moisten the foliage. The area sprayed should also be held to a minimum. Dalapon is effective through root absorption, and where selectivity is desired, leaching into the soil should be avoided.

Amitrol is a translocated material with rather specific uses. In our area it is probably used most widely for control of cattails, white top, white horse nettle, poison oak and as a general roadside or ditchbank spray when weeds are small. Repeated applications are reported effective on Bermuda grass and nutgrass. It has only limited soil action. The addition of a wetting and penetrating agent frequently increases effectiveness. A recently developed liquid formulation, Amitrol-T, is showing increased activity. It is important to use Amitrol for specific susceptible weeds, since others such as morning glory are not satisfactorily controlled. Another feature of the action of this chemical is that with some weeds the kill is better on older mature plants than on young vigorous growth. Undoubtedly other uses and perhaps selectivities will show up as we gain further experience with this chemical.

There are several new materials in the soil applied group. Two of these listed, Mylone and Vapam, are classed as soil fumigants, since the action occurs with at least part of the chemical in the vapor phase. This means they must be used in soil that is moist but not saturated. There must be spaces between the soil particles for movement of the vapors. Sealing in some manner, usually by applying water to the soil surface, is necessary to prevent too rapid diffusion of the vapors away from the soil. Erratic results can be expected if the soil is variable in type or moisture content, or if the application is not uniform. These materials are highly useful, particularly for treatment of limited areas. They will kill, however, only the portions of the plants con-

Barden Clay Quiz

DO YOUR DUSTS HAVE GROUND ROLL?

Ground or plane dusts made with Barden Clay develop a "ground roll" covering the *underside* as well as the upperside of the leaf. Use Barden's low bulk density to modify heavy and abrasive diluents for maximum quality and best performance at low cost. Barden is the industry's kaolin standard for a carrier-diluent in wettables and dusts; for an anti-caking conditioner in prilled fertilizers, and 93-94 percent sulfur.

These Barden features make it superior for all formulations: lowest abrasion...better sticking...high bulking value...greater uniformity...better deposits ...maximum economy...superior wettables.

Working samples on request.

J. M. HUBER CORPORATION
630 Third Ave., New York 17, N. Y.

Wise owls read Huber Technical Data. Ask to be put on our mailing list.

FOR DUST OR SPRAY
USE BARDEN CLAY
The Low-Cost Scientific Diluent
HUBER

Interested in 75% Wettables and Concentrates? Zeolex 7A is the new synthesized carrier for top results. It's versatile, too: serves as a bulking agent, and as a static-free conditioner for 99 percent sulfur grinding. Write for more information.

tacted by the vapors in toxic concentration.

Among the soil sterilants there are several materials on the list—Atrazine, Simazin, the chlorinated benzoic acids (Benzac and Trysben) chlorinated phenylacetic acid (Fenac) and the older materials, Erbon (Baron) and Chlorea. All of these are root-absorbed, although they may have some activity through the foliage as well. In order to be effective, they must be in the soil; in the zone where absorbing roots occur; at the time the roots are active; in sufficient concentration; and for a long enough time to permit absorption of lethal quantities. Simazin is increasing rapidly in use as a sterlant, although much remains to be known about it. It is highly insoluble, and needs considerable moisture to affect deep rooted weeds. Atrazine, a relative of Simazin, is more soluble, and may be a better choice for perennial weeds. Not all weeds are equally susceptible, Johnson grass for example is highly resistant.

The benzoic acids are particularly effective on morning glory and Russian knapweed, providing almost total eradication of existing plants with a single treatment. The soil residual may prevent replanting of many crops for a season, but this is less residual than with most other sterilants of comparable effectiveness. The newer chlorinated phenylacetic acid (Fenac) may be as effective and at lower per acre rates.

This has been only a brief review of some of the newer chemicals, with the accent on what sort of chemicals they are, rather than specific recommendations which can be read from the label. Let me close by emphasizing again the importance of knowing something about the chemical in addition to the label statements. Get to know the chemicals you are selling and using—know what they will do and what they won't do, and under what conditions. *YOU* are the most important factor in the *USE* of pesticides.★★

WISCONSIN CONFERENCE

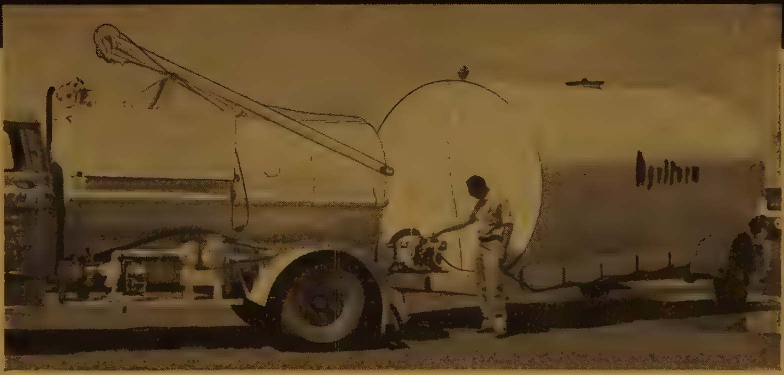
(From Page 34)

Grains." The materials recommended for small grains in Wisconsin at present are Ceresan M, Ceresan 75, and 100 and 200, and Panogen 15 and 42. Two new liquid mercury materials under test recently are also now recommended for use on small grains in Wisconsin. These products are Ortho LM Seed Protectant and Chipcote. In comparison with the Panogen and Ceresan materials, the new liquid mercury preparations provided adequate control of smut and blight.

Cyprex Effective on Apple Scab

IN a report on "Fungicide Residue Studies in Relation to Control of Apple Scab," three fungicides, Glyoxide, Captan, and Cyprex, were compared under severe scab conditions. Cyprex proved to be the most effective of the three

FLOMAX All-Iron
PUMPS FOR
LIQUID FERTILIZER



The truck is a mobile bulk station with its permanently mounted FLOMAX 8. The trailer, with its own FLOMAX 8, becomes a completely self-contained nurse tank at any farm or ranch—no matter how remotely located. Agriform Co. (Wash.) uses FLOMAX pumps exclusively.

MP Pumps—the FLOMAX SELF-PRIMING CENTRIFUGALS—Engine Driven (or belt or electric motor drive) are now the standard for pumping Liquid Fertilizer.

The Open Adaptor: Liquid being pumped can *never* touch the engine shaft or bearing or get into the engine itself.

The greaseless Seal: covered by fluid at all times. Never needs lubrication.

Continuous, uninterrupted operation is absolutely important. You must not have interruption of pumping during the handling or application of liquid fertilizer. You have continuous performance operation with the MP FLOMAX series.

All-Iron
for
Liquid Fertilizer

FLOMAX 5	5,800 GPH
FLOMAX 8	8,400 GPH
FLOMAX 10	11,100 GPH
FLOMAX 15	15,900 GPH

Send NOW for complete information

MARINE PRODUCTS CO.
591 LYCASTE AVE. • DETROIT 14, MICH.

MP PUMPS

materials, with Captan second. It was suggested that the eradicative action of Cyprex is responsible to a large degree for its effectiveness.

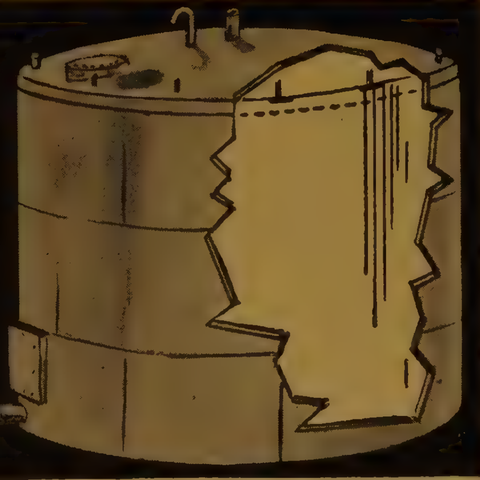
Earl K. Wade of the Dept. of Plant Pathology, Univ. of Wis., reported on "Potato Seed Treatment to Control Verticillium Wilt." Two treatments, Captan and a Semesan Bel dip treatment, were both effective in reducing Verticillium wilt infection.

E. P. Van Arsdel of the Lake States Forest Experiment Station reported on test work conducted in an attempt to find a systemic fungicide which would be effective against white pine blister rust in western white pine. Of many substances tested, Cycloheximide (Acti-dione) was found to be the most effective. As the treatment is now conducted, all potential crop trees are treated in pine stands. This proved to be cheaper than searching out infected trees. Acti-dione is a product of the Upjohn Company, Kalamazoo, Mich.

Test work was also conducted with Acti-dione on eastern white pine in the Lake States. It is considered too early to evaluate the material for this application, although results are reported promising.

Field tests with a series of fungicides were reported on by D. L. Coyier, A. C. Hildebrandt, and M. P. Backus, Univ. of Wisc., in a paper, "Control of Powdery Mildew and Black Spot on Roses." Fungicides included in the trials were Cyprex, Zineb, Phaltan, COCS (copper oxychloride sulfate), Acti-dione P.M., Phytoactin, and Karathane. In general, the fungicides were about equally effective; however, the products which control black spot effectively were poor for control of powdery mildew and vice versa. Flower production seemed not directly related to disease control. Materials which were only mediocre in the control of both black spot and mildew were outstanding in relation to average flower weight.

K. P. Buchholtz reported on "Use of Simazine and Atrazine for Weed Control in Corn." The triazine herbicides, he indicated, have proved to be outstanding materials for pre-emergence application in corn. Both materials are effective on a wide variety of annual broad-leaved and grassy weeds. Corn appears to be completely tolerant of any reasonable application of either material. Both products have a long residual effect in the soil. A moderate to heavy rain within a week or ten days after application, however, is necessary to leach the herbicides down to the germinating weed seeds. Unless such rain fall occurs within several weeks after application, poor control will normally result. Both products might leave toxic residues in the soil if applied at excessive rates. Oats are very sensitive to such residual amounts of these chemicals, and peas are also reported sensitive.★★



don't be caught short!

Add Acid Storage Now At ¼ Normal Cost!

Now you can have all the storage you need for phosporic acid, ammonium nitrate, other acids and corrosive liquids.

You can convert or add ordinary, inexpensive tanks made of mild steel or even wood by simply installing amazing FLEXI-LINERS. These flexible, laminated plastic liners fit in tanks of any size or shape, hold from 100 to 30,000 gallons. Use them with tanks of any type . . . vertical, horizontal, or even open-top design. All outlets are built right in the liner.

FLEXI-LINERS

for all non-pressure storage

FLEXI-LINERS cost only one-fourth as much as high-priced stainless steel or rubber-lined vessels. You save even more by installing them easily yourself or with the help of our factory-trained servicemen.

Best of all, you'll get years of trouble-free performance from every FLEXI-LINER. Widely used in the chemical industry, FLEXI-LINERS have already built a reputation for long-life and economy.

Don't be caught short next season when FLEXI-LINERS can solve your extra storage problem at a 75% saving.

Write for FREE FOLDER and Price List

FLEXI-LINER COMPANY

359 EAST MAIN STREET • PHONE 8-4365 • DECATUR, ILLINOIS

N. E. WEED CONFERENCE

(From Page 53)

readings. Kansel F_2 gave satisfactory control when used at a higher rate.

R. C. Wakefield and R. J. Hull, Rhode Island Experiment Station, advised that the most satisfactory treatments they had found for control of chickweed in alfalfa seedlings were: Neburon, EPTC, Diuron, DNBP, and CIPC.

Persistence of Herbicides in the Soil

"The rate at which the phytotoxic properties of a herbicide disappear from treated soil has been the subject of several investigations", said C. M. Switzer and W. E. Rauser, Ontario Agricultural College. It is apparent that environmental conditions such as temperature, rainfall, soil type, and cultivation are involved. The following is a summary of their findings.

Both Simazine and Atrazine have been shown to lose their toxicity at rates of 2 pounds active material per acre within 8 weeks under conditions of relatively high moisture (irrigation as required to maintain good growth) and summer temperatures. However, under dry conditions (summer of 1958) enough remained even after 12 months to bring about marked chlorosis in oats. Atrazine, however, appeared to disappear from the soil faster than Simazine at low rates, but at 5 to 6 lbs/A it was as persistent. The other triazines could be rated in order of activity and persistence as follows: Methoxy Propazine, Propazine, Ipazine, Trietazine and Chlorazine.

Urox appeared to be the most persistent of all herbicides studied. A rate of 10 lbs/A suppressed all growth throughout two growing seasons. Monuron was similar to Simazine in its rate of disappearance, with Diuron losing toxicity somewhat more quickly. Urab suppressed growth for 4 months after application, but had no effect the following season.

E. M. Hahn, University of Delaware, was elected president of the Conference for 1960, succeeding L. G. Utter, Diamond Alkali Co., Painesville, Ohio. L. J. Southwick, Dow Chemical Co., Midland, Mich., has been named vice president and D. A. Schallock, Rutgers University, will continue as secretary-treasurer.

A certificate of merit was awarded to William F. Meggitt, Rutgers, for his outstanding paper, "The Influence of Cultivation on Corn Yields When Weeds are Controlled by Herbicides"; and the annual County Agent Award went to Stewart K. Wright, Schoharie County, New York, for his outstanding work in herbicide demonstrations.

A total of 650 registrants were reported at the meeting. This was said to be the largest registration in the history of the conference. The 1961 meeting will be held Jan. 4-6 at the New Yorker.★

AC

G. B. Williams, founder of the Williams Chemical Co. in 1926, died last month in Miami, Fla. The Williams Co. was Miami's first chemical company.

FERTILIZER ECONOMY

(From Page 36)

The Indiana survey showed that farmers react primarily to economic incentives in deciding where to buy their fertilizer. There are a number of factors which enter into the decision of fertilizer buyers in selecting a dealer. In our survey we identified nine factors which were then sub-classified into economic, semi-economic and non-economic factors. The results are presented in Table 5.

Table 6. Number and per cent of farmers who checked other dealers' prices prior to buying fertilizer, and the average number of dealers contacted.

	Yes	No	No. of dealers contacted
Number	104	199	501
Percent	34	66	
Average			1.65
Range			1-11

Price (or cheapest source) was among the most frequently mentioned reasons given for buying fertilizer from a given source. In each of the survey counties, this was the second most commonly mentioned factor, being exceeded in importance only by "convenience". These two reasons (convenience and cheapest source) together with Farm Bureau membership accounted for approximately one-half of all of the factors offered by farmers in explanation of why they bought fertilizers from a given source.

Retail fertilizer prices, as reported by both farmers and dealers, varied within counties for the same fertilizer analysis. Farmers were generally aware of these differences. There was a good deal of variation, however, in the extent to which farmers in the three sample counties "shopped around" prior to purchasing their fertilizer in the spring of 1956. Farmers who "shopped around" more were also willing to travel farther to obtain their fertilizer. For the combined three-county area, more than two-thirds of the farmers surveyed bought their fertilizer within a radius of 10 miles from their farms, while only 8 per cent had bought from sources which were more than 20 miles distant (Table 7).

Table 7. Distance traveled by farmers to obtain fertilizer.

Miles	Per cent
0-5	37
6-10	36
11-15	13
16-20	6
21-25	2
over 25	6

A Question for the Future

From this discussion has emerged a picture of the fertilizer market which has two dominant characteristics.

a. *Growth*—Fertilizer is a dynamic, growing industry. There is every indication that it will remain so.

In Indiana, this growth will be concentrated most heavily in the Southwestern and Central portions of the state.

b. *Competition* — A market characterized by informed customers who are not adverse to shopping around or going directly to the manufacturer puts increasing pressure on each dealer to operate as efficiently as possible.

We leave it to you to analyze the impact of these two forces on the future organization of the fertilizer market and on your own operations.★★

ROUND TABLE

(From Page 39)

Figure 4. As soon as all the materials making up the batch have been accumulated in the top compartment, the mixing gates are immediately lowered. Upon lowering of the mixing gates, one can readily understand that the various ingredients contained in all three thirds of the batch are discharged simultaneously and are blended as they drop from the upper compartment into the lower mixing compartment of the machine.

Figure 5 shows the batch as it has been accumulated in the lower compartment of the machine. The mixing gates of the upper compartment are closed to immediately receive the next batch.

Figure 6. This illustration shows the mixing gates of the lower compartment in the discharge position, with a second blending-in-action taking place as the batch leaves the mixer. Note the second batch being accumulated in the upper compartment, while the first is being discharged. The Sackett Mixer's ability to handle two batches simultaneously greatly speeds up the mixing cycle.

Mixing Conventional Fertilizers

“THE underlying theory of mixing dry solids,” observed Robert E. Robinson, Atlanta Utility Works, “is based on certain natural properties of these solids. There are many ways of accomplishing mixing, and choice of method and equipment is dependent on these properties and other requirements.” Mr. Robinson discussed in particular the rotary drum batch mixer for dry mixing of solid fertilizers, commenting on use of this equipment for granulation and ammoniation in addition to mixing. When proper conditions of temperature, moisture, liquid phase, and motion of a fertilizer mixture are achieved, a physical occurrence known as agglommeration or granulation occurs naturally. In some cases this is done entirely in a flighted rotary drum batch mixer, but sometimes the mixing and ammoniation are done in the mixer and granulation is completed in a rotary drum following the mixer, with or without additional heat. There are factors for and against use of the batch mixer for this purpose, but at the present time a number of manufacturers are carrying out this type of operation to produce either semi-granulated or sized granular fertilizers. The reactions provide the required heat. Liquid phase properties and moisture content are governed by formulation. Solid raw materials may be granular, and in some cases recycled fines are used as a control. Unfortunately, we frequently find that we are leaving the area of ideal rotary drum batch mixer operation. When we operate with a mix that it too wet, we have sticking and material build up, power consumption goes up rapidly, the ammoniation efficiency drops sharply, and material is much harder to discharge from the mixer. Abrasion and corrosion become worse, fuming can become a bad problem, and maintenance costs can increase. Generally the machine required is heavier and will have more accessories such as knockers, extra doors, and other special features. Successful operation of batch mixers for this purpose is dependent on maintaining physical conditions suitable for accomplishment of the granulation process, as well as for accomplishment of mixing and amoniation reactions, and in addition, conditions must be maintained within the operating capabilities of the batch mixer.

Mr. Robinson discussed operating procedures, installation and maintenance of the rotary drum batch mixer.★★

FRY MODEL CSG

IT'S IN THE BAG!

- ASSURE YOUR PACKAGE:
  Shipping and carrying strength...
  Moisture protection...
  Sift-proof closures...
  Neat appearance.
- ASSURE YOUR PRODUCT:
  Safe, compact packaging...
  Long shelf life...
  Fresh quality.
- TESTED AND PROVEN FOR:
  Insecticides, fertilizers, chemicals, cement paint. wheat paste, milk powder, dog foods, briquets, corn meal; powders and other granular products.

▲ SIMPLE ADJUSTMENT TO PROPER BAG HEIGHT.

▼ EXIT VIEW.

SEND TODAY FOR FREE INFORMATIVE BROCHURE

GEORGE H. FRY COMPANY

42 East Second Street, Mineola, N. Y. — Pioneer 6-6230

ILLINOIS MEETING

(*From Page* 61)

tests. Also tested was a system in which plowing, planting, and treating were made in the row at the some time. The results, he said, together with a few observations, indicate that this procedure needs further study.

Pre-emergence weed control was discussed by F. W. Slife, University of Illinois crops production specialist, who said that the introduction of granular pre-emergence materials commercially in 1959 created a great deal of interest. Much more granular equipment will be available in 1960, he said.

1959 was a good year for pre-emergence weed control, Mr. Slife said. Most treatments worked because of frequent rains during May and early June, he pointed out. New pre-emergence materials such as Amoban, Atrazine, Randox-T, and Falone gave results comparable to existing materials, Mr. Slife said, but he felt that several years more evaluation will be needed to tell whether these materials have attributes that will put them ahead of such materials as Simazine, Randox, 2,4-D, and Alanap.

Because considerable corn injury was reported in 1959 from the use of Eptam, Mr. Slife reported, it is not recommended for general weed control in corn but it is highly recommended for the control of wild cane and Johnson grass seedlings in corn. Recommended rates are three pounds per acre incorporated in the top inch in either granular or liquid form.

Good weed control was observed for both Simazine and Atrazine in 1959, he said. Both materials control all annual weeds when they work, and the major difference between them is that Atrazine is slightly more soluble in water than Simazine. He recommended that both should be used at three pounds active ingredient on heavy black soils in the northern two-thirds of Illinois and at two pounds in the southern third.

Randox and Randox-T performed well in 1959, Mr. Slife said. Randox is recommended for corn and soybeans where grasses are the major problem. Granular and liquid forms should be used at the rate of four pounds active ingredient per acre. He said that both forms seem to perform equally well. They should be used only on the heavier type soils, he recommended.

Alanap gave good weed control in soybeans in 1959, although a few reports of early stunting of beans were received. Mr. Slife said that this apparently was temporary. Alanap will be widely available as a two pound active ingredient per gallon liquid or a 10 and 20 per cent granular, he reported. Both forms performed equally well. An application rate of four pounds active ingredient per acre is suggested.

Granular formulations of most pre-emergence herbicides will be widely available in 1960, he said. They probably will cost slightly more per acre, but this may be offset by greater convenience in handling. Before a farmer makes a complete change in equipment, Mr. Slife cautioned, he should check prices carefully and be certain that the change is economically sound.

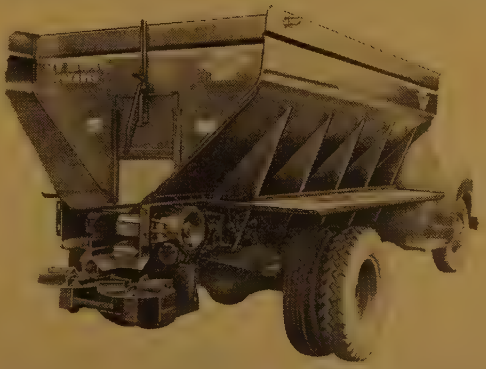
Reporting on control of cutworms and grape colaspis, J. H. Bigger said that colaspis control was better when insecticides had been broadcast on an area. Yields were improved and plant populations were higher.

Cutworm control test results also indicated that better control was obtained with broadcast treatments. In a field with 500 plants in each treated and untreated area, the untreated area showed 38 (7.6 per cent) cut plants. The row-treated area showed 26 (5.2 per cent) cut plants, and the broadcast-treated area showed 4 (0.8 per cent) cut plants.

Part II of "Agricultural Chemicals" report on the Illinois Custom Spray Operator's Training School will appear in the March issue.

Faster, More Uniform Lime and Fertilizer Spreading With a

NEW LEADER L-19S SPREADER



- **PTO Driven, self-unloading Lime and Fertilizer Spreader!**
- **Twin Spinners and 24" Conveyor!**
- **Fast, low cost operation!**
- **Available with full line of optional attachments!**

DEMAND FOR CUSTOM SPREADING IS GROWING

More and more farmers want the convenience of a bulk spreading service. It saves them time, equipment and maintenance expense *plus*, up to $4–$8 per acre over bagged goods. Let us help you get started in business with "New Leader".

MAIL TODAY

HIGHWAY EQUIPMENT COMPANY

658-B D Ave., N. W. Cedar Rapids, Iowa

NAME..

ADDRESS..

TOWN..............................STATE.....................

☐ Farmer ☐ Operator ☐ Student

Mail coupon for L-19S literature and a copy of "Your Land Is Different" a booklet designed to help you sell more bulk fertilizer.

SILIKIL

DEATH BY DEHYDRATION TO

cockroaches - fleas - termites silver fish and many other insects

Advantages:

1. Long residual
2. No chemical decomposition
3. Odorless
4. Effective under high humidity
5. Adheres to treated surfaces

Now available in 3 grades

SILIKIL L — 6 pounds per cubic foot for attic application—drywood termites

SILIKIL — 12 pounds per cubic foot heavy dust for P. C. O.s for inside work — roaches

SILIKIL D — 22 pounds per cubic foot an extremely heavy silica for P.C.O.s

ALL SILICA PRODUCTS ARE AVAILABLE WITH **PYRENONE** FOR QUICK KNOCK-DOWN

Convenient package sizes — 1, 5, 15 lb. containers

UNITED Heckathorn

600 South Fourth Street
Richmond, California

415 Lexington Avenue
New York, N. Y.

WRITE FOR NAME OF DISTRIBUTOR CLOSEST TO YOU

CONCENTRATED SPRAY EQUIPMENT

Mixtures and Application Methods

by Samuel Frederick Potts

650 Pages	$12.50 in U.S.A.
Illustrations	$13.50 elsewhere

Contents

Fundamentals of Application
Ground Spray Equipment
Aerial Equipment
Control of Weeds and Woody Plants
Mixtures • Aerosols • Terminology

This book provides a thorough and up-to-date coverage of concentrated sprays, a relatively new concept in the application of agricultural chemicals. It will meet the requirements of custom applicators, growers, foresters, municipalities, etc.

The broad field of concentrated spray application has grown rapidly over the past few years so that today several times as many acres now are treated with concentrated spray as with conventional spraying and dusting. As a result many types of hand, ground, and aerial equipment have been developed for the application of myriad spray formulations and combinations. This book brings together and clarifies the fundamentals and potentialities of this whole subject.

Send Check With Order

DORLAND BOOKS
P. O. Box 31
Caldwell, N. J.

Enclosed is our check for $12.50 (Foreign and Canada $13.50) covering a copy of **CONCENTRATED SPRAY EQUIPMENT.** It is understood that we may return the book in ten days for full refund.

Name ....

Address ....

City .... Zone .... State ....

Table 2. Effect of giberellin with five fungicides on severity of bean root rot.

Chemical and rate of application	Gibberellin ppm	Type of application	Average disease ratings[a]	Variation from inoculated check
Urea-formaldehyde	1	Sprayed on	1.0	–1.2*
5 ml, drench	5	primary leaves	0.2	–2.0**
Vapam-4S	1	Sprayed on	0.9	–1.3*
1 ml, drench	5	primary leaves	0.4	–1.8**
Urea-formaldehyde	50	In talc	2.5	0.3
5 ml, drench	5	seed coat	2.7	0.5
Vapam-4S	50	In talc	0.7	–1.5**
1 ml, drench	5	seed coat	0.6	–1.6**
Orthocide 75	0	In talc	2.1	–0.1
45 mg per	5	seed coat	2.3	0.1
30 seeds	50		1.1	–1.1*
Pittsburgh C-272	0	In talc	2.9	0.7
.5 mg in 4 gm	5	seed coat	2.7	0.5
talc per 30 seeds	50		2.6	0.4
Oligomycin	0	In talc	3.1	0.9
.5 mg in 4 gm	5	seed coat	2.5	0.3
talc per 30 seeds	50		3.1	0.9
Sterile Check			0.9	–1.3*
Inoculated Check			2.2	
L.S.D. .05				1.0
L.S.D. .01				1.4

*Indicates significant difference at 5 per cent level.
**Indicates significant difference at 1 per cent level.
—Indicates less root rot infection than inoculated check

LISTENING POST

(*From Page 73*)

cide 75 with gibberellin 50 ppm applied as a seed treatment.

Effects of Gibberellin. — Rackham and Vaughn observed that, in general, the higher concentrations of gibberellin in spray applications resulted in somewhat greater pod set, foliage growth, vining, and root rot control, than did the less concentrated foliar sprays or the seed treatments. The higher concentrations advanced plant maturity by about 10 days and the lower concentrations by about 7 days. Foliar applications showed the greatest increase in plant growth, especially at the higher concentrations. Older leaves of plants sprayed with 50 ppm and 500 ppm of gibberellin showed nutrient deficiency symptoms.

Root-rot indexes of plants sprayed with 5, 50, and 500 ppm of gibberellin without fungicidal treatment were somewhat higher than the inoculated check.

Foliar applications of gibberellin at 50 ppm and 500 ppm were used in a preliminary trial, but produced excessive growth stimulation and so were omitted in the tests reported. Only mild stimulation resulted from sprays containing 1 or 5 ppm of gibberellin.★★

●

Systemics For Bean Pests

Experimental success with two systemic insecticides for use in both granular and liquid form against bean pests has been reported by the U. S. Department of Agriculture.

Used in these forms, rather than as spray or dust, phorate (Thimet) and Di-Syston — *0,0*-diethyl *S*-2 (ethylthio) ethyl phosphorodithioate—controlled the two-spotted spider mite. Control lasted for two to three months in experimental plots of lima beans, according to scientists of USDA's Agricultural Research Service.

The insecticides were applied at planting time through nozzles or tubes attached to the planter boots so as to place the insecticide in the soil with the seed.

Glendon's
INSECTICIDE GRADE
PYROPHYLLITE

The ideal diluent and carrier for insecticides

★ *Chemically inert*—Insecticide Grade Pyrophyllite (aluminum silicate) has a pH range between 6 and 7. Because it is non-alkaline and chemically inert, it is thoroughly compatible with all leading pesticide chemicals. Will not react with them and lower their effectiveness.

★ *Non-Hygroscopic*—Dusts compounded with Glendon's Insecticide Grade Pyrophyllite will not absorb moisture. Thus there is no tendency for the finished formulation to cake even following long storage.

★ *Uniform* — Ground in a continuous mill and then treated in an air separator to remove oversize particles, 92 to 95% of the resulting product will pass a 325 mesh screen. Average particle size is below 5 microns. Weight, 32 lbs. per cu. ft. Because of its favorable physical characteristics and uniformity it forms homogeneous mixtures with pesticides and will not, like some other diluents, settle out from the active ingredients upon standing.

★ *Superior Adhering Properties* — Because it is difficult to wet, Glendon's Insecticide Grade Pyrophyllite clings firmly to plant leaves even through heavy rains.

★ *Superior for Aerial Application* — When used as a carrier in dusts for aerial application, Glendon's Insecticide Grade Pyrophyllite has been demonstrated to settle more quickly than other diluents, thus minimizing the hazards of drift, waste of toxicant and failure to hit target areas.

GLENDON DIVISION
CAROLINA PYROPHYLLITE COMPANY
P. O. Box 2414 GREENSBORO, N. C.

SHAMROCK FERTILIZERS, Ltd., has opened a new phosphate plant on the North Quay of Wicklow town, Ireland.

AC

UNITED CO-OPERATIVES OF ONTARIO, Canada, will build a fertilizer plant at Tillsonburg, Ont.

HELICOPTER OPERATOR

(*From Page* 59)

matoes which were badly infested with water grass and many other grasses.

Brentwood's technique was to plant tomatoes, then irrigate the land. Just prior to the emergence of the tomato plants from the ground, we sprayed 35 gallons per acre of carrot oil to kill microscopic-sized weeds which had germinated ahead of the tomatoes.

With pre-emergence control of this type, the cost for weed control and thinning of this 500 acres in 1958 was approximately $20 per acre for helicopter and chemicals. In previous years, the cost was a minimum of $85 per acre for hand control and thinning. This amounts to a saving of roughly $30,000, which was like money in the bank.

The assistant manager of this farm has used airplanes extensively for various types of aerial application and stated flatly that no airplane could have done the job our helicopters did. Uniform application, a necessity for weed kill, could not have been achieved by an airplane, he said.

DiGiorgio Fruit Corporation of San Francisco hired us in 1958 to apply a fungicide to prevent brown rot on 100 acres of apricots at their Wolfskill Ranch near Winters, California. We were able to achieve excellent control with two applications, one following the other by one week. Conditions were far from ideal. The first application was followed by a three-inch rain and the second was followed by four inches of rainfall. After the last application, a somewhat unseasonal siege of prolonged wet weather and overcast skies set in.

DiGiorgio realized excellent control of brown rot while their neighbors all but lost their fruit. DiGiorgio realized a 50 per cent higher production and commanded premium rates. The helicopter's superior penetration paid off.

Uniformity of application and penetration features also produce superior results in defoliation work. Our rate for defoliating seed alfalfa is $3 per acre, compared with the standard $2 to $2.50 per acre charged by airplane operators. Yet our work in this area grows every year. We have customers like Hector Brothers of Westley, California, and Hammond Ranch of Dos Palos, California, who feel that use of the helicopter makes for a more profitable harvest.

For seed alfalfa defoliation, we normally put down one quart of dinitro in 10 gallons of diesel oil per acre or approximately 4 to 6 quarts of Endothal in 10 gallons of water. Hector Brothers

REPUBLIC STEEL | SULPHATE OF AMMONIA

80 LBS.NET
REPUBLIC SULPHATE OF AMMONIA
REPUBLIC STEEL
Nitrogen 21%
Manufactured by REPUBLIC STEEL CORPORATION
CLEVELAND, OHIO, U.S.A.

- Top Quality
- Free-Flowing
- Bagged for Direct Application
- Bulk Form for Mixing and Blending
- Prompt Delivery
- Regularly Scheduled Shipping Intervals

REPUBLIC STEEL

Write, wire, or call:

REPUBLIC STEEL

DEPT. AC, 1441 REPUBLIC BLDG. • CLEVELAND 1, OHIO
Export Department: Chrysler Building, New York 17, N. Y.

tells us their experience indicates that, with our helicopters, the vegetation dries faster, allowing combines to get into the field sooner and to work more efficiently when they are harvesting. A good kill results in less seed loss through shattering while combining.

This also reduces by days the time the farmer has to take a chance on the weather. This is important because a single rain could cost as much as 200 pounds of seed per acre, depending upon the yield of the crop.

Quality application is what the helicopter agricultural operator has to sell. He also has to prove that the superior work which he delivers will build profits for the farmer at year's end. Farmers, generally, are skeptical businessmen when it comes to spending money. We contend that our agricultural operation could not have grown and profited as it has unless we were delivering visible proof of our sales story.

Service is, of course, another extremely important commodity in dealing with farmers. In our case, one of the first things we do when we are commissioned to work for a large farm is to map the acreage. With some continuing farmer customers, we have worked techniques out to the point where the farmer simply calls us and says, "Send a 'copter to Field 14 at 10:30 a.m. tomorrow. Chemicals will be waiting." We're there.

This is where our radio communications system pays off.

From the operator's point of view, of course, profits are made in agriculture only when helicopters are covering acres. We have worked out techniques to get our machines back in the air within forty seconds after they land for a new load of chemicals. We operate four powered tankers which constantly agitate our chemical mixtures and pump chemicals into tanks when helicopters land for new chemical loads.

We have developed spray booms of our own (most of them covering a 34-foot swath) and nozzles to control application of chemicals in accordance with the application required. This all is part of the business, and calls on the operator for a great deal of ingenuity and technical planning.

To turn a profit in any business, it is important to know how costs and income balance out and it was for this purpose that we installed a complete system of cost accounting. We can break our profit structure down by almost any classification. For instance, we can learn on short notice exactly how profitable a certain crop has been to us at a certain price structure. Or, we can learn whether a certain farm has been a profitable customer. If prices need to be increased, we know exactly where, on what crops, and how much.

We are into agriculture and expect to continue growing in agriculture. But at the same time, as indicated above, we are impressed with the growing industrial market. Hubert C. Brown, a Stockton vice president, is our industrial sales manager and reports every day to an office in San Francisco like any other business man.

Already, we have gone into power line patrol, oil exploration and survey work, movie camera flying, construction jobs, air taxi work, wire stringing for utilities, and real estate appraisal flying. In each one of these industrial applications, the helicopter has impressed our clients both with its ability and its dollars-and-cents value to them.

As we build, most of our profits continue to go back into the business. No wonder, then, that we foresee the day not long off when we will be operating twice our present number of helicopters and will provide steady employment for a force double our present year-round staff of 20 full-time and four part-time people.

Although the helicopter age is here, there is no denying that it is in its infancy. We see nothing but growth and more growth both for ourselves and for helicopter operations in general.★★

Danitra

For
IMPROVED
PERFORMANCE

Add Trace Elements to your Brand Name Fertilizer . . . with Water Soluble

NUTRA-MIN

the only water soluble blend of:
MANGANESE, IRON, COPPER, ZINC, BORON, MOLYBDENUM

Available in 100 lb. drums or factory blended with your material in our

CUSTOM PACKAGING DIVISION

in units of one pound or more. We package and ship under your own Brand Labels.

PRODUCTION LINE ECONOMIES. PLANT LABORATORY AND EXPERIENCED PERSONNEL FOR PRODUCING QUALITY CONTROLLED WATER SOLUBLE FERTILIZERS AT METUCHEN, N. J.

Davies Nitrate Co.
INCORPORATED
118 LIBERTY STREET NEW YORK 6, N. Y.

"USE WITH CONFIDENCE"

A NATURAL QUALITY PRODUCT

TAKO

Airfloated: Bagged or Bulk

Guaranteed less 1% free moisture

QUALITY & SERVICE SINCE 1939

A NATURAL HIGH GRADE COLLOIDAL KAOLINITIC KAOLIN

"TAKO" — Airfloated Colloidal **Natural** Kaolinitic Kaolin, Fertilizer Grade, is practically a chemically pure inert **natural** colloid with exceptional qualities. Excels as a coating agent or conditioner of granulated or prilled high analysis fertilizers, absolutely preventing sticking or caking in production, most satisfactory in eliminating bag set. **"COSTS SO LITTLE—DOES SO MUCH."** Used in large tonnage year after year.

NON-ABRASIVE NON-HYGROSCOPIC NON-CAKING FREE-FLOWING

THE THOMAS ALABAMA KAOLIN COMPANY
2412 KEN OAK ROAD, BALTIMORE 9, MARYLAND

IT WILL PAY YOU TO INVESTIGATE "TAKO" FOR YOUR REQUIREMENTS

Shipping Point:
Plants:
Hackleburg, Alabama

Uniform Quality
Prompt Shipments

Laboratory Services

- Biological evaluation of insecticides
- Screening of compounds for insecticidal, fungicidal, herbicidal, and bactericidal properties
- Flavor evaluation of pesticide-treated crops
- Bio-assay and chemical determination of insecticide residues on crops
- Chemical determination of insecticides
- Pharmacology including warm-blooded toxicity studies
- Other biological, chemical and microbiological services

PROJECT RESEARCH AND CONSULTATION
Write for Price Schedule

WISCONSIN ALUMNI RESEARCH FOUNDATION

P.O. BOX 2217 • MADISON 1, WIS.

A BASIC PRODUCER FROM MINE TO FINISHED PRODUCT

SULFURIC ACID

QUALITY
RELIABILITY
ABUNDANCE
RAPID SERVICE
TECHNICAL ASSISTANCE
VARIETY OF GRADES AND STRENGTHS

TENNESSEE CORPORATION,
The Southeast's Leading Sulfuric Acid Supplier

Our complete control of raw materials from mine to finished product allows our total independence from elemental sulfur and enables TENNESSEE CORPORATION to accommodate and ship large tonnages of acid quickly and with minimum notice.

The sulfur contained in the ore we process yields Virgin Sulfuric Acid of highest quality free from organic matter, very low in iron, and in no way contaminated from regenerated or spent sulfuric acid sources.

We produce all commercial grades and strengths of Sulfuric Acid from 60° Baume through the various Oleums.

We would welcome the opportunity to tell you our story—Call JAckson 3-5024 Atlanta, Ga. or write

TENNESSEE TC CORPORATION
615 629 GRANT BLDG, TENNESSEE CORPORATION ATLANTA 3, GEORGIA

CLIP AND MAIL TO

AGRICULTURAL CHEMICALS, P.O. Box 31, Caldwell, N. J.

Please enter subscription(s) as follows:
(Check or money order enclosed)

☐ One year, $3.00 (Canada $4.00; Foreign $9.00)
☐ Two years, $5.00 (Canada $7.00; Foreign $15.00)

NAME ....
(Please Print)

FIRM ....

STREET ....

CITY ....

MAIL COUPON NOW!

AGRICULTURAL CHEMICALS offers practical features on manufacturing processes, market information, merchandising aids, survey data, and technical and toxicological data on agricultural chemicals. Also included are monthly features by industry experts on topics of current interest, reviews of technical literature, new industry products, equipment, and bulletins and news about the agricultural chemicals industry.

COTTON CONFERENCE

(From Page 47)

tive ingredients are applied," he said. "Further work at this station has disclosed that over a five-year period, one nozzle placed directly over the row resulted in equal insect control and yields as compared with more complex arrangements employing up to three nozzles per row." Mr. Wilkes pointed out that other experiment stations are conducting similar studies on methods of pesticide applications.

The low-volume sprayer is the most important development in equipment for application of agricultural chemicals in recent years, remarked T. E. Corley, Auburn University, Auburn, Ala. He said the low-volume sprayer is the one piece of equipment that can be used for all pest control and defoliation work. "It is fast becoming a standard piece of equipment on cotton farms. Yet many farmers and farm leaders are not familiar with the many applications and proper use of the sprayer."

The sprayer's basic elements—pump, strainers, hoses, pressure regulator and guage, and tank—may be used for all cotton spraying jobs. Nozzle types, sizes, arrangements, and methods of mounting vary with the spraying job, Mr. Corley pointed out.★★

BENSON STATEMENT

(From Page 37)

ing a food is to *follow instructions on the label.*"

He indicated that an intensified educational program is needed to insure proper use of present products, — as well as further research to develop improved, more efficient and safer products, calling for further research "to develop (1) new methods to control insects and other pests that do not involve the use of chemicals, and (2) safe chemicals for pest control and improved methods for their application and use—for example, with specific attractants to gain greater effectiveness with smaller dosages."

The Secretary advised that in the opinion of entomologists, "biological methods offer the best chance for control of destructive insect pests by non-chemical means," but he emphasized that "the biological agents we have discovered and learned to use so far cannot begin to solve our pest-control problems. Farmers must still depend primarily on safe, effective, and economical chemicals to produce the quantity and quality of crops and livestock necessary for the Nation's needs."

PROFESSIONAL DIRECTORY

SOIL & PLANT TESTS

SOIL FERTILITY PROBLEMS

EVALUATION OF
AGRICULTURAL CHEMICALS

Dr. Wolf's Agricultural Laboratories
2620 Taylor St. Hollywood, Fla.

Chemical & Engineering Analyses, Research & Development
Agricultural Chemical Analyses.
Insecticides, Fungicides, Herbicides,
Rodenticides, Fertilizers.
Toxicology. Market Research.
Product Development.
Ask for complete details; call —
WAtkins 4-8800
or write to:
SNELL
Foster D. Snell, Inc.
29 W. 15th STREET
New York 11, N. Y.

Sperling Laboratories
TOXICOLOGY—PHARMACOLOGY
PHYSIOLOGY

Acute-Subacute-Chronic Studies
Screening - Pharmacodynamics
Consultation

JEfferson 4-9220
6815 N. 24th St. Arlington 13, Va.

A. EDISON BADERTSCHER
Graduate Entomologist
Consulting — Labels — Products
Thirty years experience in preparation of labels and compounding household, industrial, and garden insecticides, pet products, insect repellents, and soluble plant foods.
Science Center Building
1113 N. Rolling Rd. Baltimore 28, Md.
Phone: Ridgeway 7-1044

— COMPLETE —
LABORATORY SERVICE
Small and Large Animal Research
Toxicity Tests, Human Patch Tests.
Bacteriology—Screening, Testing.
Research—Bactericides, Fungicides
Chemistry—Visible, Ultraviolet, Infrared
Spectroscopy, Chromatography.
New Products. Pilot Plant.
Write for Brochure.
SCIENTIFIC ASSOCIATES
3755 FOREST PARK AVE.
ST. LOUIS 8, MO. JE. 1-5922

FLORIDA FIELD TRIALS

Evaluations
of
Agricultural Chemicals.

DR. G. R. TOWNSEND
Box 356
Belle Glade, Florida

Theodore Riedeburg Associates
Consultants

Marketing & Development
Agricultural Chemicals
Chemical Specialties

415 Lexington Avenue
New York 17, New York
MUrray Hill 7-1488

ALVIN J. COX, Ph.D.
Chemical Engineer and Chemist
(Formerly Director of Science, Government of the Philippine Islands. Retired Chief, Bureau of Chemistry, State of California, Department of Agriculture.)
ADVISER ON AGRICULTURAL CHEMICAL PROBLEMS AND INVESTIGATIONS
Consultant in reference to spray injury and damage, claims, including imports of fruits and nuts, formulas, labeling, advertising and compliance with law.
1118 Emerson Street
Palo Alto, California

ANOTHER FAMOUS 40&8

THE NEW KLM DC-8 JET CARGO SERVICE. The original "40&8" was a French boxcar during World War I. The boys in the A.E.F. knew it as their Pullman to the front. After that ride, it was all on foot, through the mud to the trenches. The "40&8" took its name from the load capacity stencilled on its side . . . 40 Hommes & 8 Chevaux . . . 40 Men & 8 Horses. It was and is the most famous boxcar in history. But now, KLM whose own history dates from World War I, introduces another "40&8," destined to be just as famous in its own right. On its 40th Anniversary, KLM introduces its new **DC-8** Jet Cargo Service, soon ready to carry your products to the selling fronts the world over. It will deliver your shipments in a few hours or overnight to any market on the globe. It will reduce your inventory and handling costs, open up vast marketing areas to increase your profits. For more information on the new KLM "40&8," contact your freight forwarder, cargo agent or KLM, 609 Fifth Avenue, New York 17, N. Y. — PLaza 9-2400.

THE WORLD OVER
KLM
ROYAL DUTCH
AIRLINES
THE WORLD'S FIRST AIRLINE

CLASSIFIED ADVERTISING

Address all classified replies to Box Number, c/o Agricultural Chemicals. P. O. Box 31, Caldwell, N. J.

Rates for "Help Wanted" advertisements are 20¢ per word; minimum charge $3.00. Rate for individuals seeking employment is 5¢ per word, $1.00 minimum.

Advertisements of new machinery, products and services accepted at rate of $10.00 per column inch. Minimum space, one inch.

Copy closing date, 10th of preceding month.

Checks must accompany all orders.

Situations Wanted:

SALES MANAGEMENT OR BASIC SUPPLIER REPRESENTATIVE for fertilizer or agricultural chemicals. Agricultural graduate, 15 years successful experience—management and sales. Desires change. Address Box 265, c/o Agricultural Chemicals.

ENTOMOLOGIST—Commercial pilot. Employed S.E. Asia. Interested job with Aerial Applicators. Fly, travel. Available May 1960. Educational—employment history on request. Address Box 266, c/o Agricultural Chemicals.

SOIL FERTILITY SPECIALIST, Ph.D., 7 years field experience academic, commercial agronomy. Desires position, research, food processing company, commercial agricultural laboratory. Address Box 267, c/o Agricultural Chemicals.

**Looking for a job—a man—
a piece of equipment?—
Advertise!**

**FIRST CLASS EQUIPMENT
FROM YOUR FIRST SOURCE**

Double Ribbon Blenders; all sizes Tumbling Batch Mixers to 300 cu. ft. Hammer Mills, Pulverizers, Crushers, Sifters, Separators and Screens, Stainless Tanks, Kettles, Reactors, Raymond Imp Mills, Whizzers etc. Dryers, Coolers, Evaporators.

We Buy Your Surplus Equipment
Send for "FIRST FACTS"

FIRST MACHINERY CORP.
209-289 Tenth St., Brooklyn 15, N. Y.
STerling 8-4672

**$3,000,000 LIQUIDATION
CHEMICAL PLANT AT
ORANGE, TEXAS**

Type 316 Stainless Steel Tanks, Kettles, Heat Exchangers, Columns, Stills, Crystallizers, Centrifugals, Pumps, Valves, etc.
WONDERFUL VALUES. SEND FOR LIST

PERRY EQUIPMENT CORP.
1428 N. 6th Street, Philadelphia 22, Pa.

Help Wanted:

PLANT PATHOLOGISTS, ENTOMOLOGISTS, CHEMISTS—Ph.D. or equivalent, to supervise research projects in herbicides, fungicides, growth regulators, nematocides and insecticides. Preferably with training or experience in entomology, plant pathology, organic chemistry and plant physiology. Non-supervisory positions also available.

INORGANIC or PHYSICAL CHEMIST—Ph.D., 0-5 yrs. experience for exploratory research in fertilizer technology.

Send resumes to: Dr. David M. Clark, W. R. Grace & Co., Washington Research Center, Clarksville, Maryland.

ZONOLITE VERMICULITE highly absorptive, inorganic, lightweight carrier for any type chemical. Low density. Cuts carrier costs. Formulates without caking or balling up. Technical information and assistance to help you work out new formulae on confidential basis. Also working samples, prices. Dependable service and supply from over 40 ideally located Zonolite plants.

ZONOLITE COMPANY, Industrial Div.
Dept. AC-20, 135 S. LaSalle St., Chicago 3, Ill.

For Sale:

Offer 4,000 gallons 40% Butyl Ester, $1.70 per gal., 55 gal. drums, FOB Kansas City. Also offer 10,000 gallons DDT 25% Emulsifiable Concentrate, $1.10 per gal., 55 gal. drums, FOB Denver, Colo. 2,4-D, 2,4-5T and all major insecticides at lowest prices for truckload cash buyers. Time Chemical Corp., 5321 Dahlia St., Denver 16, Colo.

A. M. EGGEMAN has joined the Witco Chemical Company, Inc., New York, as assistant director of purchases. Mr. Eggeman's previous experience in purchasing includes 13 years with the Rexall Drug Company.

AC

HOLLAND R. WEMPLE, retired vice president and director of the Texas Gulf Sulphur Co., New York, died recently in Springfield, Ill.

1 Yr. $3.00
2 Yrs. $5.00

**ARE YOU KEEPING IN TOUCH
WITH YOUR INDUSTRY?**

Complete up-to-date news of the agricultural chemicals industry is reported monthly in

AGRICULTURAL CHEMICALS.

Enter your subscription now and keep informed!

AGRICULTURAL CHEMICALS
P. O. Box 31, Caldwell, N. J.

YES! Send me Agricultural Chemicals
Enclosed is my check for $..................

Name ....
Address ....
City ....
Company ....

Elected by Idaho Group

Jack Wursten, Simplot Soil Builders, was elected president of the Eastern Idaho Plant Food and Chemical Assn., at the group's recent meeting in Idaho Falls.

Wilbur Brown, Rogers Brothers, was elected vice president and Lyle Whiting, Jefferson Coop, was re-elected secretary-treasurer.

•

Carbyne Available In Spring

Carbyne, Spencer Chemical Co.'s wild oat herbicide, will be sold on a limited basis this spring to farmers in both the United States and Canada. The herbicide recently was approved by the U. S. and Canada Departments of Agriculture for trial use on specified crops in 1960.

•

OK Sevin For Ornamentals

Sevin has been granted label acceptance by the U. S. Department of Agriculture for use on roses and other ornamentals. R. H. Wellman, manager of Crag Agricultural Chemicals, Union Carbide Corp., New York, said that small packages containing Sevin will be sold through garden supply dealers next spring.

•

Mass. Pesticide Bill

An act has been introduced in the Massachusetts House of Representative to require that insecticides, rodenticides, herbicides, and fertilizers be tested and approved before they may be used on edible fruits and vegetables.

The proposed act states that anybody who uses a pesticide or fertilizer which has not been tested and approved by the department of public health shall be punished by a fine of not more than $100.

•

Ferro Reports Record Sales

Sales and earnings figures for the Ferro Corp., Cleveland, indicate that the firm had its best year in history in 1959. Consolidated net income was $3,331,000, up 68 per cent from $1,986,000 in 1958.

Robert A. Weaver, chairman, said that economic indicators predict that the year ahead for Ferro will be "every bit as good as 1959, if not better."

•

Fills New Position

William J. Dibble has been appointed to the newly-created position of director of marketing for the United States Borax & Chemical Corp., Los Angeles. He had been executive assistant to the vice-president in charge of marketing.

•

Southern Control Meeting

The Association of Southern Feed and Fertilizer Control Officials will hold its annual meeting at the Riverside Hotel in Gatlinburg, Tenn., June 21 and 22.

FERTILIZER USE

(From Page 32)

than in 1957-58. Increases in the other classses of materials were 144,000 tons (6.0 percent) for phosphates, 40,000 tons (8.9 percent) for potash, and 13,000 tons (2.7 percent) for the natural organics.

Primary Plant Nutrients—During the year ended June 30, 1959, fertilizers used in the United States contained 7,396,000 tons of primary plant nutrients (N, available P_2O_5, K_2O) (table 4). This represented a substantial increase in primary nutrients (884,000 tons, 13.6 percent) from that consumed in the preceding year. Consumption of nitrogen was 2,643,000 tons, an increase of 359,000 tons (15.7 percent); that of available P_2O_5, 2,576,000 tons—283,000 tons (12.3 percent) more; and that of K_2O, 2,177,000 tons—242,000 tons (12.5 percent) above their amounts in 1957-58. Consumption of these nutrients increased substantially over any previous year and reflects the removal of acreage allotments as well as soil fertility programs.

Primary nutrients in mixed fertilizers represented; 37.3 percent of the nitrogen, 78.8 percent of the available P_2O_5, and 87.4 percent of the K_2O. Mixed fertilizers were accountable for 36.8, 82.3, and 90.1 percent of the increases in consumption of these nutrients, respectively. The larger use of the six grades previously listed supplied approximately one-half of the increase in tonnages of these nutrients.

The weighted average of primary nutrients contained in mixed fertilizers continued its upward trend. These averages were for nitrogen, 6.20 percent; for available P_2O_5, 12.76 percent; for K_2O, 11.94 percent; and for the total of these nutrients, 30.90 percent. The corresponding values in the preceding year were 5.96, 12.53, 11.73, and 30.22 percent.

Materials consumed for direct application represented; 62.7 percent of the nitrogen, 21.2 percent of the available P_2O_5, and 12.6 percent of the K_2O. Increases in consumption of these nutrients accountable to materials were, respectively; 63.2, 17.7, and 9.9 percent. The combined increase in consumption of anhydrous ammonia, nitrogen solutions, and ammonium nitrate represented more than 80 percent of the increase in nitrogen consumed as direct application materials. In the phosphate materials, the increase in consumption of the ammonium phosphates and superphosphates accounted for practically all of the increase in available P_2O_5, and that of K_2O in the increase in use of potassium chloride.

Increases in primary nutrients accountable to both classes of fertilizers (mixtures and materials) were proportionate to their respective contents reflecting a general increase in consumption of all primary nutrients. The proportionate increase in consumption of primary nutrients in 1959 compared with 1958 was highest in those areas in which increases in planted acreage of cotton and corn was highest (West North Central) and lowest in those areas in which there was little change in planted acreage (New England).

INDEX to ADVERTISERS

Allied Chemical Corporation —
  General Chemical Division 60
  Nitrogen Division 67, 70
American Agricultural Chemical Co. 44
American Cyanamid Co. 26
American Potash & Chemical Corp. ... 3rd Cover
Amoco Chemicals Corp. ..... Dec.
Armour Agricultural Chemical Co. 94
A. Edison Badertscher 117

Bagpak Div., International Paper Co. ..... Dec.
H. J. Baker & Bro. 23
Baughman Manufacturing Company ..... Sept.
Bemis Bro. Bag Co. 96
Bio-Search & Development Co. ..... Jan.
Bradley Pulverizer Co. ..... Jan.

Chase Bag Co. ..... 2nd Cover
Clark Equipment Co. 80
Clupak, Inc. 74
R. D. Cole Mfg. Co. ..... Dec.
Combustion Engineering, Inc.,
  Raymond Division ..... Jan.
Continental Can Co. ..... Dec.
Commercial Solvents Corp. 40
Cox, Dr. Alvin 117

Davies Nitrate Co. 115
Davison Chemical Division,
  W. R. Grace & Co. 10
Diamond Alkali Co. ..... Oct.
Dorr-Oliver Inc. 92

Eastern States Petroleum
  & Chemical Corp. ..... Jan.

Fairfield Chemical Div., Food
  Machinery & Chemical Co. 11
Ferro Corp. 100
Flexi-Liner Co. 108
Floridin Co. ..... Jan.
Fry Co., Geo. H. 110

Geigy Agricultural Chemicals ..... Dec.
General Chemical Division —
  Allied Chemical Corp. 60
Glendon Pyrophyllite Co. 113
Grace Chemical Co., Division of
  W. R. Grace & Co. ..... Nov.
Greeff & Co., R. W. ..... Jan.
Grumman Aircraft Engineering Corp. ..... Jan.

Hahn, Inc. ..... Jan.
Harris Laboratories Inc. ..... Jan.
Hercules Powder Co. ..... 4th Cover
Highway Equipment Co. 111
Hi-Shear Rivet Tool Co. 62
Hooker Chemical Corp. 98
Huber, J. M. Corp. 106

International Paper Co.,
  Bagpak Division ..... Dec.
International Minerals & Chemical
  Corp. 20, 21

Johns-Manville Co. 4

Kennedy Van Saun Mfg. & Eng. Corp. ... 84
KLM Royal Dutch Airlines 118
Kolker Chemical Corp. 89
Kraft Bag Co. 48

Magnet Cove Barium Co. 87
Marine Products Co. 107
McDermott Brothers Co. ..... Jan.
Monsanto Chemical Co. 72

Niagara Chemical Division,
  Food Machinery & Chemical Corp. 6
Nitrogen Division —
  Allied Chemical Corp. 67, 70

Olin Mathieson Chemical Corp. 76, 77

Penick & Co., S. B. ..... Oct.
Phelps Dodge Refining Corp. 52
Piper Aircraft Corp. ..... Jan.
Potash Company of America 3
Poulsen Co. ..... Jan.
Prentiss Drug & Chemical Co. ..... Dec.

Randolph Products Co. 66
Raymond Division, Combustion
  Engineering, Inc. ..... Jan.
Reideburg, Theodore Associates 117
Renneburg & Sons Co., Edw. ..... Jan.
Republic Steel Corp. 114
Rohm & Haas Co. 64

St. Regis Paper Co. 12, 13
Scientific Associates, Inc. 117
Shell Chemical Co. 56
Snell, Foster D., Inc. 117
Sohio Chemical Co. 18
Southeastern Clay Co. ..... Jan.
Southwest Potash Corp. 14
Spencer Chemical Co. ..... Jan.
Sperling Laboratories 117
Spraying Systems, Inc. ..... Jan.
Standard Oil Co. (Indiana) ..... Jan.
Stauffer Chemical Co. 22
Stepan Chemical Co. ..... Jan.
Sturtevant Mill Corp. 19
Swift & Co. 15

Tennessee Corp. 17, 116
Texaco, Inc. ..... Dec.
Texas Gulf Sulphur Co. 90
Thomas Alabama Kaolin Co. 116
Townsend, Dr. G. R. 117
Transland Aircraft 62

Union Bag-Camp Paper Co. 8
United Heckathorn 112
U. S. Phosphoric Products, Div.,
  Tennessee Corp. 88
United States Borax & Chemical Corp. ... 7

Vanderbilt Co., R. T. 104
Velsicol Chemical Corp. ..... Nov.
Vulcan Containers 16

West Virginia Pulp & Paper Co. 24, 25
Wisconsin Alumni Research Foundation 116
Witco Chemical Co. ..... Dec.
Dr. Wolf's Agricultural Labs. 117

TALE ENDS

TIGHTENING restrictions on pesticides may very well result in curtailment of research and development of new products, in the opinion of those familiar with the reaction of corporate managements to recent developments in the pesticide field.

In a recent talk before those attending the Northeastern Weed Control Conference in New York, Dr. L. Gordon Utter of Diamond Alkali, president of the conference, observed that top management is currently "taking a jaundiced look at new chemicals brought in from their research laboratories, even those that show promise." With the cost of development of new pesticide products so high, he commented, it is no more than reasonable that, before making the substantial investment required in a new product, management "wants to be reasonably sure that the new products will stay on the market long enough to return a profit."

While Secretary Flemming is making headlines, and political hay, he may also be shutting off development of new pesticides which the country will need in the years ahead.

—AC—

A TYPICAL AGRICULTURAL CHEMICALS SUBSCRIBER SAYS

"I look forward to reading Agricultural Chemicals because . . .

it can be relied upon to give accurate, up-to-date information on the latest developments in the field of chemicals for agriculture. It is a valuable source of information for us at Calspray and I feel that it fulfills a most important function in providing vital information while serving as a sounding board for members of the agricultural chemicals industry."

Howard Grady
California Spray Chemical Corp.
Richmond, Calif.

California Spray Chemical Corporation is one of the largest producers of pesticides, fungicides, insecticides and weed killers in the country, with mixing and formulating plants throughout the United States, Canada and Europe. Calspray's operations are unique in that the company not only operates its own plants and is a basic supplier of Captan, but also extends its operations to include the marketing and distribution of its products. The ORTHO brand name needs no identification, being well known in the trade and to its thousands of customers, both in Agriculture and the garden and home market.

Howard Grady is executive vice-president of the corporation, and a well known figure in the pesticide industry. He has been active in the NACA for many years.

— Leader in the Field —

AGRICULTURAL CHEMICALS

CALDWELL NEW JERSEY

Member Audit Bureau of Circulations

Virginia-Carolina Chemical Corp. has announced a company-supported employe stock purchase plan. It will contribute a dollar for every two dollars an employe invests in V-C stock, and, further, will guarantee the employe against loss for two years. All employes who have been with the company as long as 18 months are eligible to participate in the new plan. Top limit is 10% of base pay.

AC

We had heard reports from time to time that systemic pesticides were commercially available which would control both insects and diseases on roses. A testing program has been under way at Cornell University to check up on these claims and to determine whether such a product is as yet a reality. John A. Naegele, asso. prof. of entomology, advises that they have not been able to substantiate any such claim. "Unfortunately," he reports, "all the materials that were submitted to us with these properties claimed have never really demonstrated the fond wishes of the manufacturers."

—AC—

You can build a plant that will turn out a product too good to sell,—too good, at least, to sell in its particular market area. This fact was brought home to us forcefully recently when we heard of a fertilizer plant being offered for sale by a co-operative located in the south. It can turn out 60 to 70 tons a year of a 15-15-15 product, carrying out the complete manufacturing operation from unground phosphate rock all the way through to finished bagged product. Unfortunately, the growers of the area were not willing to pay the price for a product of this quality level. If the plant were located in the Great Plains states, there would be no problem in selling it, —and, in all probability no need for the present operators to think of giving it up.

AC

The Food and Drug Administration has just brought out a new booklet, "What Consumers Should Know About Food Additives." The booklet, in addition to its discussion of nutrient supplements, sweeteners, preservatives, emulsifiers, stabilizers, thickeners, etc., also adds a few comments on pesticides, which are described as a "special class of additives." Top figures in the insecticide business have been quick to point out that pesticides have never before been considered, and should not be classified as any type of additive, "special" or otherwise. For as they point out, no one goes around "adding" pesticides to any food product. A grower or food handler may have to "use" pesticides to keep a food product pest-free, but he doesn't ever "add" a pesticide to any foodstuff. Let's keep the record straight, F.D.A.

AC

More stringent rules governing the shipment of ammonium nitrate are reported under consideration by the Interstate Commerce Commission.

quality fertilizer begins here...

with TRONA'S*

new, specially-sized granular

POTASH

Quality fertilizer granulation begins with **Trona**'s all-new, specially-sized granular muriate of potash. The carefully regulated and controlled screen size results in reduced segregation and uniformity of finished product. Whatever your mixing method—batch or ammoniation, **Trona**'s new **granular** assures a quality fertilizer uniform in particle size.

TRONA **American Potash & Chemical Corporation**

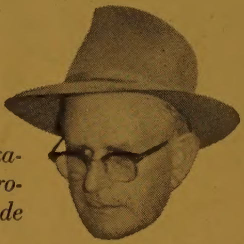
LOS ANGELES • NEW YORK • SAN FRANCISCO • PORTLAND (ORE.) • ATLANTA • CHICAGO • SHREVEPORT • COLUMBUS (O.)
Main Office: 3000 West Sixth Street, Los Angeles 54, California
New York Office: 99 Park Avenue, New York 16, New York
Plants: TRONA AND LOS ANGELES, CALIFORNIA; HENDERSON, NEVADA; SAN ANTONIO, TEXAS
(AMERICAN LITHIUM CHEMICALS, INCORPORATED AND SAN ANTONIO CHEMICALS, INCORPORATED)

*TRADENAME AND TRADEMARK OF AP&CC

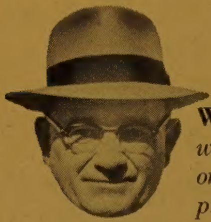
Producers of: BORAX • POTASH • SODA ASH • SALT CAKE • LITHIUM • BROMINE • CHLORATES PERCHLORATES • MANGANESE DIOXIDE *and other diversified chemicals for Industry and Agriculture*

THESE MEN HAVE LEARNED FROM EXPERIENCE THAT TOXAPHENE MAKES DOLLARS...AND SENSE

Hartford Jackson, Columbia, La. "*I set about the best cotton crop I have ever seen, following the toxaphene, toxaphene-DDT control program . . .*"



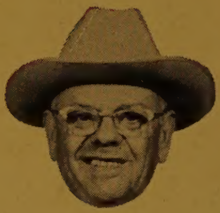
D. L. Hall, Eudora, Ark. "*The toxaphene and toxaphene-DDT control program certainly worked for me, and made me money . . .*"



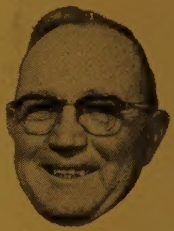
W. E. Moore, Sherrill, Ark. "*We were able to pick cotton two weeks earlier on the acreage where we followed this program. It really paid off for us . . .*"

H. C. Bradney, Montrose, Ark. "*This program saves me expensive late-season applications and does an excellent job. Last year I cut my insect control costs in half . . .*"

O. L. Cox, Ruleville, Miss. "*I got on the toxaphene program early in the season and continued on a regular schedule. I believe those six early applications paid more dividends than anything we did with our cotton crop all year long . . .*"



P. E. Cloutier, Bermuda, La. "*We set one of our best crops last year, and we think the toxaphene, toxaphene-DDT insect control program was a big factor. We're basing our 1959 program on the same plan . . .*"



Morris A. Roberson, Gilliam, La. "*I like the early production and early harvest that comes with the toxaphene insect control program. We had good control all season, and I plan to use the same program this year . . .*"

Clarence R. Smith, Cleveland, Miss. "*We believe in this program. It gave us excellent insect control, saved us money, and helped us make a cotton crop under adverse conditions . . .*"

O. L. Garmon, Jr., Marks, Miss. "*I used the toxaphene program on more than 700 acres of cotton. I know you need to get the overwintered boll weevil, and this program does that. I had good insect control all year . . .*"

Insecticide salesmen have to do more than just take orders for dusts and sprays. In the Mid-South, for example, progressive formulators and dealers are showing cotton farmers how a planned, season-long insect control program based on toxaphene can be the most satisfactory—and profitable—practice. These statements from farmers already following such a program reflect the growing interest in more effective use of insecticides.

NX59-8

TOXAPHENE

A product of the Agricultural Chemicals Division
HERCULES POWDER COMPANY
INCORPORATED
900 Market Street, Wilmington 99, Delaware